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ANIMAL KINGDOM

NEW YORK ZOOLOGICAL SOCIETY



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INSTRUCTIONS TO BINDER

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ANIMAL KINGDOM



THE MAGAZINE OF
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ANIMAL KINGDOM

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FEBRUARY 1, 1947

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THE GIFT — AND THE OPPORTUNITY

THESE ARE DAYS in which the work of our institution can be of greatest moment. These are days of pressure, when the flood of men's thoughts and energies are focused on the amazing and even dreadful inventions stemming from the purely physical sciences. This is an era when the physicist and the chemist are of immoderate importance and when by sheer pressure of events the sciences of zoology and biology are being over-shadowed. The development of our Society, expressing as it does the world of living nature, has never been more needed.

Our institution is more than a great zoo, more than the great Aquarium the City and we are planning. Our institution is more than an instrument for research; it is more than a medium for public education; it is more than a growing and vital agency for conservation of all the living natural resources of this earth necessary to wildlife and man alike. Our Society is a composite of all these vital activities and purposes. Its opportunities as well as its obligations have never been greater.

It is a wonderful thing that at just this time the Society is about to receive the bequest that is reported on another page of this issue. This is the largest single gift received by the Society in its history. It represents, it is true, only a portion of the funds that are needed to reach our objectives, but it comes at a time of greatest usefulness and will prove of immeasurable aid in advancing the work of the Society. Our organization will do everything within its power to justify the faith of the donor.

Fairfield Osborn

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Deer are notoriously excitable animals, but the four Père David's Deer fawns surprised even the staff of the Zoological Park by their jumpiness. When they were liberated in the former Fallow Deer enclosure in the northwest corner of the Zoological Park, they scattered like quail, ran blindly into fences, and dashed away at every approach of their keepers. Within a week, however, they had settled down enough to be photographed.

Now We Exhibit— The Rarest Deer in the World

By JEAN DELACOUR

THE WILD ANCESTORS of most domestic animals have disappeared from the face of the globe, some before historic times, others, like the Aurochs from which domesticated cattle descend, as late as the Fourteenth Century. But I doubt if there is another case comparable with that of Père David's Deer.

This large, very peculiar, undomesticated animal, which still exists in some numbers in an English park, has never been found in a wild state; in nature it undoubtedly has been extinct for many centuries.

Père Armand David, a Catholic missionary in China and one of the greatest field naturalists that ever lived, has himself reported the fascinating discovery of this deer, in the *Nouvelle Archives du Museum*, Paris, 1866. Here is what he wrote to Professor Milne Edwards, then the director of the great French institution:

Peking,

September 21, 1865

"A mile from Peking lies the vast Imperial Park, which may be a dozen miles around; there have lived in peace from immemorial times, deer, goitered gazelles and other animals. No European can go into the Park, but this last

spring, climbing on the wall, I was lucky enough to see, although rather far away, a herd of over 100 of these animals which looked to me like moose. Unfortunately they had no antlers at that time. What characterizes the animals I saw was the length of the tail which was proportionately as long as a donkey's—a characteristic which fits none of the Cervidae I know.

"It is also smaller than a moose. All efforts I have made so far to obtain a corpse have been unfruitful. It is even impossible to get a part, and the French Legation does not feel able to succeed in obtaining this curious animal from the Government. Fortunately I know some Tartar soldiers who guard the Park, and I am certain that for a more or less high sum of money, I can get

some skins to send you before the winter. The Chinese gave this animal the name of Mi-lou, and more often that of Ssu - pu - hsiang, which means 'The four characters which do not fit together,' because they find that this Reindeer belongs to the stag by his antlers, to the cow by its feet, the camel by its neck, and the mule by its tail."

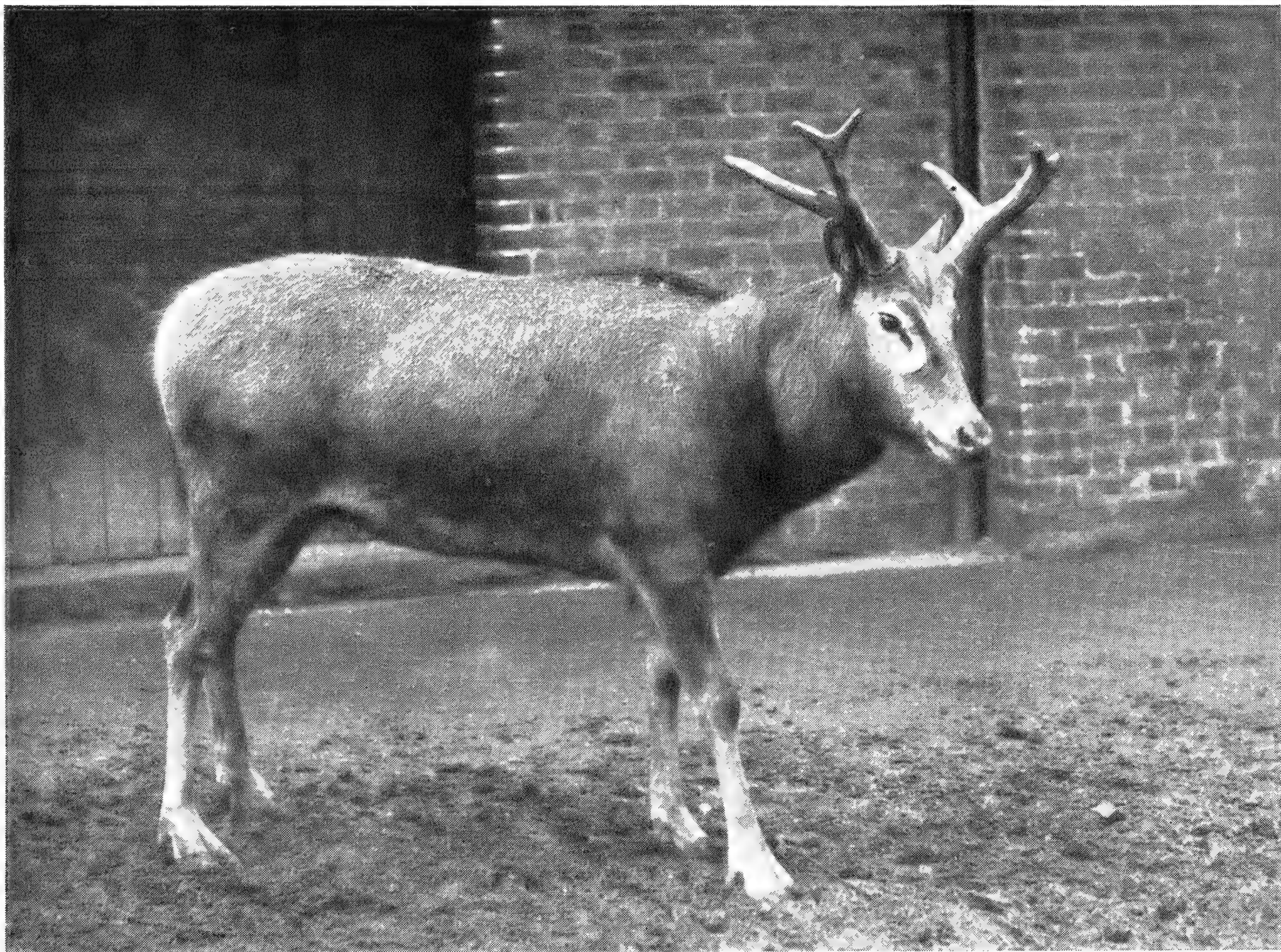
On January 1, 1866, Père David wrote again:

"I told you about an animal I have discovered



Père Armand David in Chinese Dress.

*Reproduced by courtesy of Zoo Life
Zoological Society of London*



Courtesy of Zoological Society of London

This is the way our Père David's Deer bucks may be expected to look next year, when their first antlers appear. The thick neck and large feet are already particularly noticeable.

in the Imperial Park, and which is a long-tailed Reindeer with very large antlers, the female having none, I am told. Up to now I have taken incalculable pains to obtain two; this very day I hope to get them."

On January 30 he wrote:

"In my two preceding letters I told you of a Reindeer which seems to me to differ specifically from *Cervus tarandus* Linnaeus (the Reindeer) and which I was trying to procure. With money and trouble I finally have been lucky in getting two skins, which I will send you as soon as the season permits.

"M. de Bellouet, our Chargé d'Affaires, who on my demand asked the Government for them, has just told me he has been promised two alive. Now I have one adult female and a two-years-old male, also shed antlers."

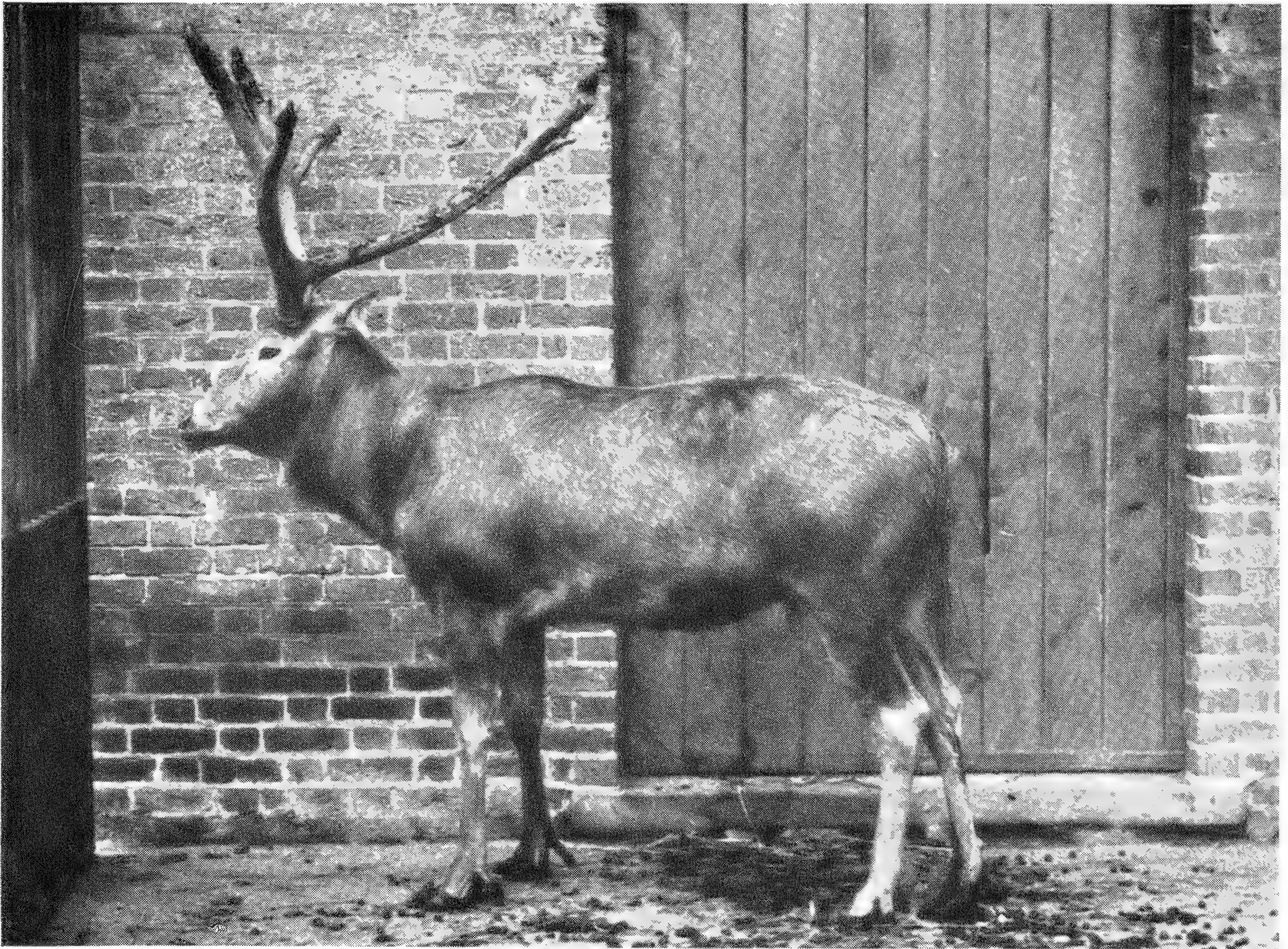
After a description of the animals, Père David continued:

"I believe they live in large numbers in the wild deserts of northern Tibet in about 36° Lat. N. What is certain is that they breed in large numbers in the Emperor's Park, where there is no lichen to browse, and that they do not seem to suffer from the long, hot summers of Peking."

Père David was mistaken about the possible occurrence of the species in Tibet. It has never been found there.

Continuing his series of letters, the missionary wrote to Paris on February 2, 1866:

"M. de Bellouet has just received a live adult pair from the Chinese ministers. He has been good enough to give me the old male which died on the way. He is huge. I will send it also. I observe this old deer has the tail shorter than the



Courtesy of Zoological Society of London

Each year sees an increase in the size and spread of the antlers and in the third year after appearance they approach maximum size; the first tine's backward sweep is pronounced.

others. The last vertebrae look atrophied, and the hair is worn out."

These specimens reached Paris in April, 1866. Professor Milne Edwards found that they were not Reindeer (*Tarandus*) and described them as a new genus, *Elaphurus*, in the *Comptes Rendus de l'Académie des Sciences* on May 14, 1866. He gave them the specific name of *dauricus* after Père David.

The photographs accompanying this article give a good idea of the aspect of this curious deer: small head, short neck, massive body, long tail, the broad feet that indicate swamp-loving habits. The form of the antlers is extraordinary and they bear no resemblance to those of any other deer. The animal's color is a light grayish-brown.

It seems perfectly acceptable, even in these

days of reaction against unnecessary splitting of genera, to place this strange animal in a special genus, and today we have really no idea as to its relationship either to any living species of deer or to the extinct forms now known. It represents a primitive type.

Fossil remains of the Père David's Deer have been found in northeastern Asia. It seems certain that in the wild state it haunted open, marshy ground. Decidedly it is not a forest animal.

Live specimens came to Europe soon after Père David wrote, through the good offices of the French Minister, M. de Bellouet, and the British Minister, Sir Rutherford Alcock. Several fawns reached the London Zoological Gardens in 1869 and, soon after, Paris. After that time the species

(Continued on page 24)

An Artist-Craftsman Tells **How to Carve Wooden Birds**

By **JOHN T. COOLIDGE**



WHITE-FRONTED GEESE CARVED BY THE AUTHOR AND MOUNTED ON WEATHERED DRIFTWOOD.

EDITOR'S NOTE: *Last spring and summer artist members of the Zoological Society exhibited their work in oils, sculpture, textiles and carvings in the Heads and Horns Museum Gallery at the Zoological Park. Mr. Coolidge's carvings of birds called forth so many expressions of admiration that we asked the artist-craftsman to reveal the secret of their making — since he had assured us it was a simple art that anyone could practice. Here, step by step, is the process that Mr. Coolidge follows. If any of our members spend their winter evenings learning to carve wooden birds, we will be interested next spring in seeing and perhaps exhibiting the result.*

WOOD CARVING has proved to be a craft particularly suited to the portrayal of birds. For example, the best decoys, made by gunners untrained in the fine arts, are widely sought for decorative use. The finest ones bring to mind some of the masterly and treasured work of ancient Chinese sculptors.

I have tried many methods, and finally have arrived at the procedure described here, which is not necessarily the best or only method, since each craftsman will, in time, settle down to ways best suited to his purposes and talents.

The first step is to draw the plan and profile of the shape to be carved. Pencil drawings from

life are useful in making the design, and even if the living model is too lively for a finished drawing, repeated attempts will serve as an aid to memory. Observations of wild birds are of great value, but the spade work can best be done with captive birds. To this end, the usefulness of a well kept collection where birds are in good health and spirits cannot be too highly appraised.

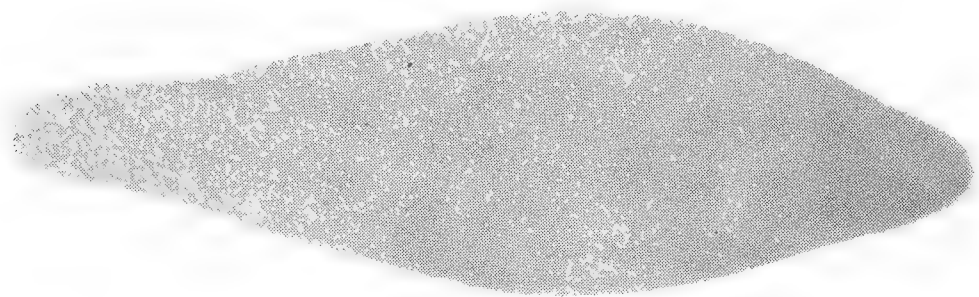


Fig. A. Template of Plan.

I find it profitable to make round trips of five hundred miles to the New York Zoological Park in quest of data, and consider those who live nearer to be envied.

Those with no aptitude for drawing may take heart from the success of the above-mentioned gunners, who usually depend upon memory alone. A bird can be designed from memory and completed without reference to the model. The finished bird may be a failure, but when the craftsman puzzles over the shape it so increases his powers of observation that the second attempt (after careful and prolonged study of the live bird) will be a great improvement upon the first. Further sharpening of the powers of observation and memory by repeating the same procedure will bring such familiarity that a competent worker will have every likelihood of success.

Chinese and Japanese artists prefer to paint or carve from their knowledge alone, and consider

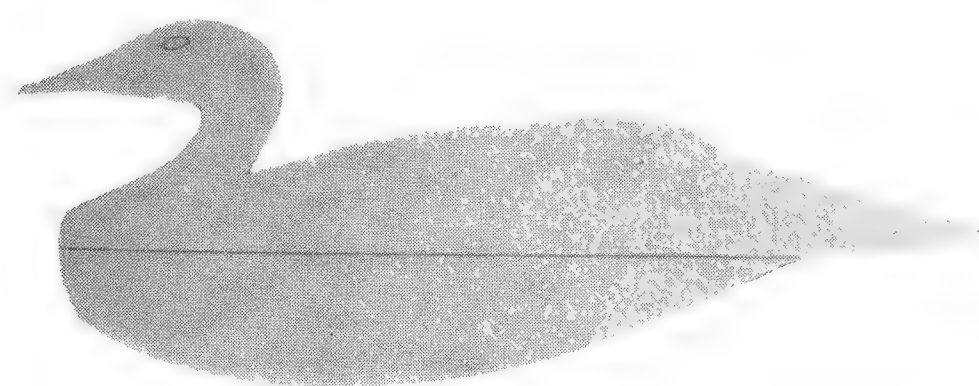


Fig. B. Template of Profile.

it important to have the subject out of sight while they are at work. They believe that copying is an imitative process which catches nothing more than the surface appearance of nature.

If experimenting with the shapes is desired, preliminary practice with modeling wax will be less laborious than spoiling numerous pieces of wood, yet this is an unflattering medium for portraying birds. Working in wax requires skill and experience to produce a plausible result. As confidence is gained, it is probable that the best carvings are made by fashioning the final material directly.

If more than one bird of the same pattern is to be carved, cut out two cardboard templates, one for the plan (A) and one for the profile (B). Since the grain of the wood must be parallel to the bird's beak, it is usually easier and makes a stronger carving to use separate pieces for the head and body. Trace the outline of the plan on the upper surface of a pine block (C), using the template to guide the pencil, and trace the profile on the side of the block, keeping the outlines in line with each other. This block is divided into upper and lower halves, the two

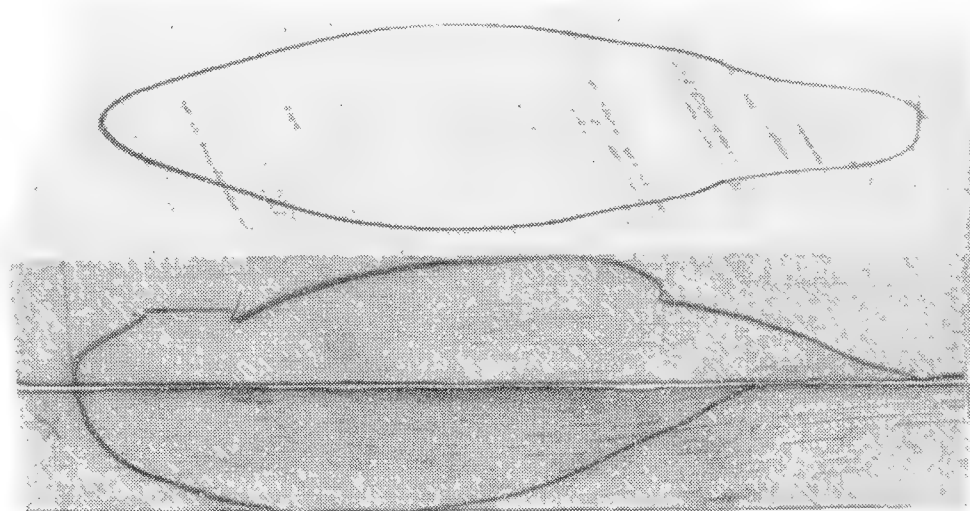


Fig. C. Block marked for sawing.

having been glued together with a sheet of paper between. Thus the blocks can be pried apart after the carving is completed.

For making birds, I prefer white pine, but there are many other suitable kinds of wood. Small branches of white pine have closer grain than large stems and are ideal for fine work.

If a bandsaw is to be had, the plan is sawed out by bandsaw. Otherwise use a power jigsaw, or, lacking that, a hand fretsaw. With the plan sawed, the central cut-out is now free to be separated from the block, but, instead of removing it, leave it in place and nail the waste wood to it with slender nails. The block can now be laid on its side and the profile sawed, which will permit all waste wood to be pulled away, leaving a

shape with the correct plan and profile but with angular corners (D). These corners must be cut away by hand and the work carved to its final shape (E).

When a short piece of pine branch is to be carved, it need not be squared. Instead, it is ripped in half and one of the halves screwed to a support or fixture (F). Saw the outline of the profile, using the template tacked directly above it to guide the saw blade. Then remove it from the fixture, hold it with the flat side up, mark with the outline of the plan, and saw again.

The finished body now consists of an upper and lower half glued together. Pry these apart and hollow each half. There are several reasons for hollowing. The inside of a piece of wood shrinks less than the outside, sometimes causing the surface to crack. This danger is serious with

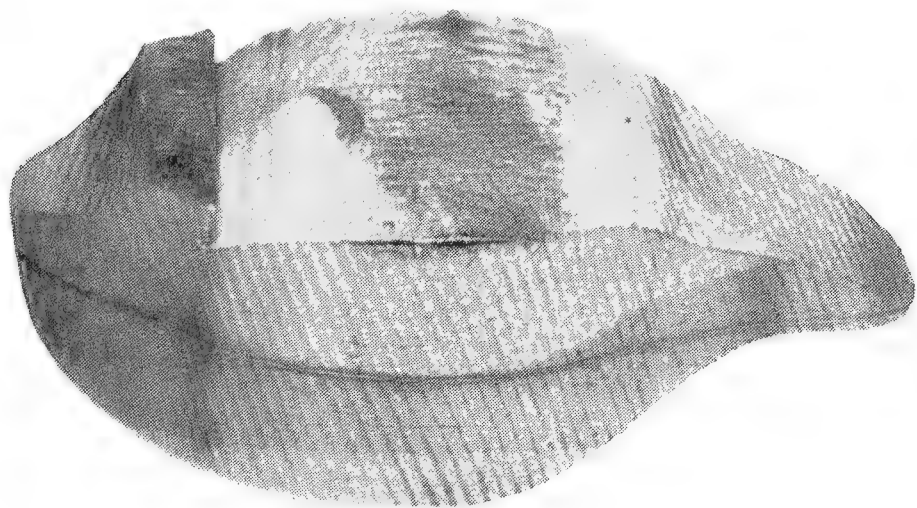


Fig. D. Block completely sawed.

life-size decoys, but less so with small pieces. Furthermore, when the body is halved, the head can be held strongly by a screw thrust upward from inside the body. Also a hollow bird is light and can be dropped or mishandled with less danger of breakage than a solid one. Another advantage is that the legs can be made of one piece of wire bent to a hairpin shape and thrust down through two holes in the lower half. This is stronger than two separate leg wires, which tend to loosen and twist. A wire of simple hairpin shape would cause the legs to straddle like an inverted V when the wood swells and would split the wood when it shrinks, but this can be obviated by bending the curved end of the vertical hairpin to a horizontal position at a right angle to the rest, leaving as long a loop as there is room for (G). The springiness of the loop will leave the wood free to move. The leg wire is

held by small staples driven inside the body and embedded in plastic wood. Cut out the head by the same process as the body, except that it need not be halved, and screw and glue it into place.

The White-fronted Goose illustrated here has such a long neck that I departed from my usual practice. Instead of fastening the head with a

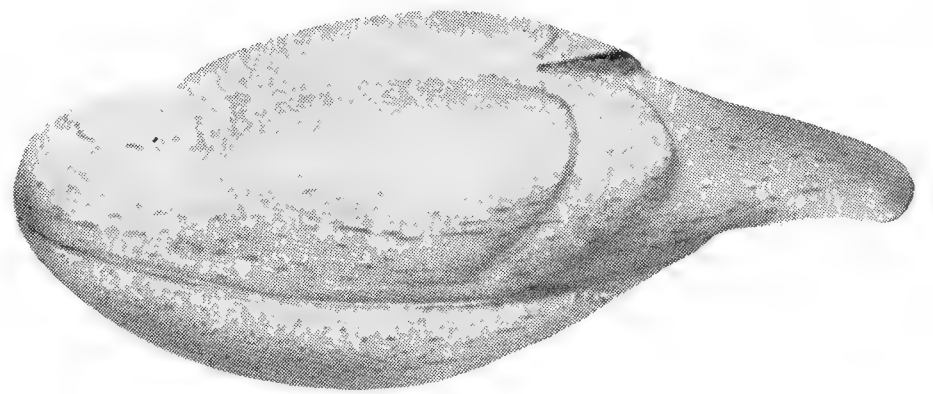


Fig. E. Block carved and sanded.

screw, I inserted a curving metal rod into the body to serve as a neck. Both ends were anchored with plastic wood, and the neck filled out with the same material. This method is useful for any bird with a long or curved neck, such as a goose, swan or crane. If wood were used, the neck would have unavoidable weak places where the grain runs crosswise, whereas a neck of plastic wood stiffened by a central metal rod provides secure support for the head.

When the head and legs are in place, glue the halves permanently together with waterproof plastic resin glue, first taking care to sandpaper off any paper that might stick from previous gluing.

I prefer metal for the ends of wings where they stand away from the body. Cut these with scissors from sheet aluminum and give them convexity by hammering the concave side with a lead

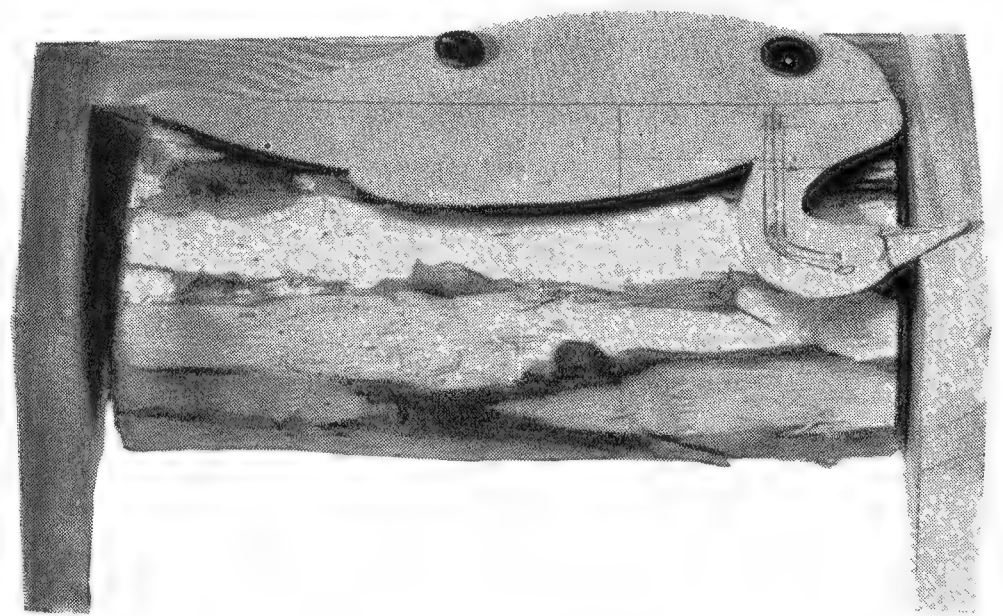


Fig. F. Fixture for guiding work in handsaw.

hammer against the end grain of a hollowed wooden block. Sink a recess as deep as the thickness of the metal in the bird's back for each wing. Fasten the wings by small flat-head screws for which holes in the metal have been drilled and countersunk.

The whole carving should now be sandpapered, though on this point opinions will differ. There are those who believe that a wood carving should show the mark of the tool and that sanding destroys its vigor and freshness. There is good company in both schools. The metal wings must be sanded as well, rubbing in all directions to give a surface to which oil paint will adhere.

Use plastic wood to plug any irregularities or nail holes and to fill the cracks where the wings join the back. Cover screw heads on the wings with a mixture of shellac and fine sawdust to fill the slots.

Elaborate the two leg wires by coating them with plastic wood, to be carved when they are

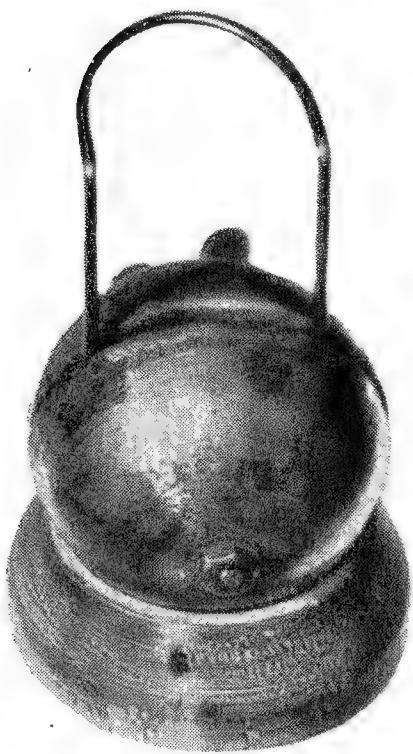


Fig. G. Wire for legs.

Fig. H. Ball and socket holder.

dry. These leg wires are cut with extra length for insertion into a piece of driftwood or other suitable stand. The feet may be cast in lead and cemented to the stand with thick shellac or white lead and further secured by a few very small wire nails. The advantage of lead for the feet is that they can be pressed down to fit the contours of the surface under them. Thick paint will fill any cracks or cavities between foot and leg.

To cast a foot in lead, make a wooden model or pattern of the foot and glue it to a flat piece of plywood or board. Paint the whole pattern, to resist moisture. Place a small box without top or

bottom (known to foundrymen as a 'drag') upon this pattern, and tightly fill it with damp sand. Turn the "drag" and its contents upside down, and lift off the pattern. A cavity in the sand of the exact shape of the foot will be uncovered into which molten lead may be poured. It would require too much space to give full details of this molding and casting process which can be learned from any foundryman's instruction book.

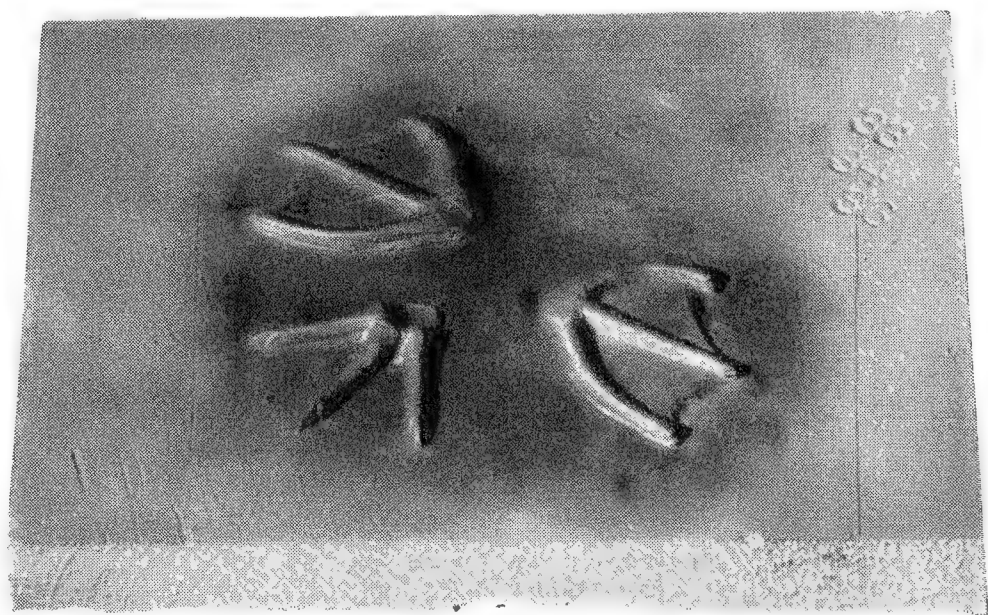


Fig. I.

Pattern for Goose feet and for a Crane's foot.

Use glass eyes from a taxidermist glued into holes in the head with shellac. If the desired color is not obtainable, turn the eyes on a lathe from close-grained wood such as boxwood, dogwood or heartwood of red cedar. After painting, two coats of clear varnish will give them a glassy surface.

This completes the carving, all but the painting, which can be done more easily before the bird is mounted on its stand or pedestal. To support the bird in any desired position while it is being painted, a simple fixture is easily constructed. Cast two lead hemispheres in sand, drill them vertically through the central axis, and bolt them together. Clamp the bird's legs between the hemispheres and place the sphere on a cup-shaped wooden base. This makes a ball and socket joint (H).

To prepare the surface of the work for the final painting, several undercoats of oil paint must be applied. The first, or priming coat, will sink into the dry wood and cling better if it is thinned with turpentine. Each undercoat must be perfectly dry before the next one is applied, otherwise the outer coat eventually will slide on

the less dry undercoats and produce a cracked surface. A week is not too long for drying each under coat. Sandpaper the entire surface after each coat has dried. With three such coats, the surface should be almost like ivory, and ready for the final coloring. A shiny surface looks unlike feathers. It can be avoided by adding turpentine and a small proportion of dry color, obtainable in powder form from dealers in house paint, to the final coat.

Colored surfaces in nature are usually more varied in hue than is generally realised. A brown bird will have some feathers a grayish-brown, others yellow or reddish-brown, and if a model of such a bird is painted a uniform brown, the surface will look like lifeless paint and not like feathers.

Sable hair watercolor brushes are excellent for coloring small models with oil paint. Although it is not absolutely necessary, a coat of flat drying varnish can be applied as a protection without causing the surface to shine.

When the final painting is dry, place the bird on its stand, and it is then completed.

Work of this sort is not only of value as an end in itself. Those who draw and paint will find their proficiency improved by the practice of working in the round. They derive a closer awareness of the third dimension and an aptitude

for depicting solidity in the flat picture. The work of coloring a solid bird is also instructive to a bird painter. When making a picture he must observe and catch the local color or markings as well as the play of light upon the solid form of the bird. Thus two factors governing a bird's appearance must be allowed for and represented in one operation. When, instead of painting a picture, the painter colors the surface of a model, he is concerned only with the first of these factors. By practicing one phase at a time, he can proceed with better understanding to the more confusing problem of coping with both.

In conclusion: here is a flattering medium which has been successfully worked by many persons with no artistic training. Not only does it provide a means for producing valued models, but it advances the worker's skill in drawing and painting.¹

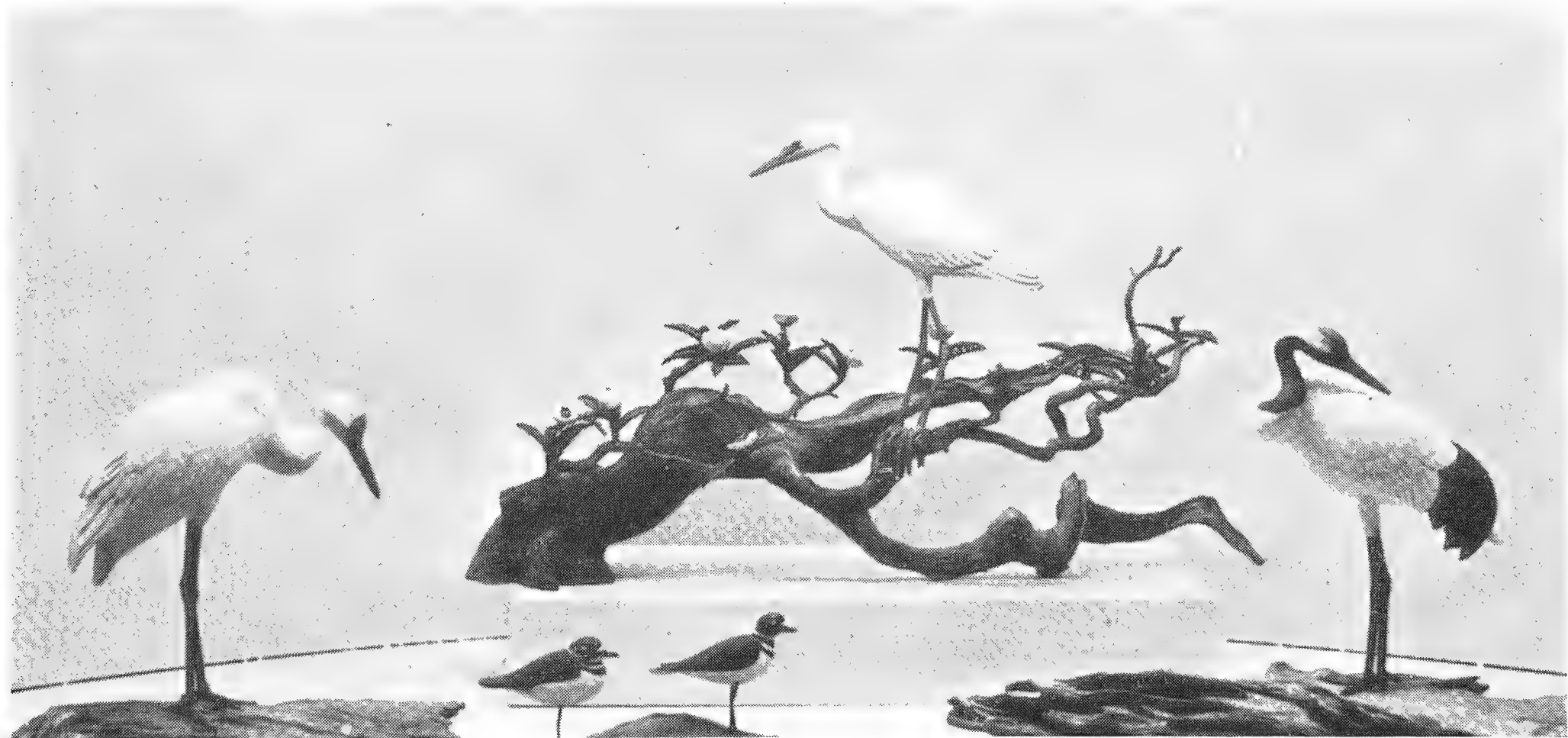
Those who find charm in the subtle variety, color, form and attitudes of living birds can capture and give to others some of the loveliness which they have found so enchanting.

¹ Suggested reading:

Bird Portraiture. Tunnicliffe. The Studio Publications, Inc., New York. (How to draw birds).

The Artist's Handbook of Materials and Techniques. Mayer. The Viking Press, New York.

Foundry Work. Wendt. McGraw-Hill Publishing Co., Inc., New York.



The artist's reward comes when he is able to exhibit such a lovely group of carved birds as these Cranes, Heron and Killdeers, recently displayed in our Heads and Horns Museum.

Our Heritage Is Threatened

By **GEORGE BREWER**

TWO AMENDMENTS to the New York State Constitution have been proposed which probably will come up for discussion and action in the present session of the Legislature. The members of the New York Zoological Society ought to know about them, for they threaten a principle of conservation that is very close to our aims and activities.

One amendment would open State Forest Reserves to permanent buildings for recreational purposes.

The other amendment would throw the State Forest Reserves wide open to mining operations.

Both, or either, would gravely injure the Forest Reserve system set up by constitutional amendment in 1894.

Here, briefly, is the story.

More than two generations ago thoughtful people were beginning to be concerned about the disappearance of the wilderness in New York State. As yet the automobile was not — but there was a network of railroad lines, highways and secondary roads that was ominous. Two generations ago men were already talking about the decline of game, how civilization had stamped out the abundance of the old days.

The feeling that the wilderness and its wildlife were a heritage that ought to be preserved for future generations was so strong in the last decade of the last century that a constitutional amendment was adopted, establishing in the Adirondack wilderness and upon State-owned property a Forest Preserve which should be forever kept as wild forest land.

Since the turn of the century large tracts in the Adirondacks and the Catskills have been acquired by the State — for example, in 1916, the magnificent peaks of Marcy, Haystack, Skylight, Coldon, Henderson, Wallface, Mac-

Two generations ago our Legislators saw what was happening and created State Forest Reserves for posterity — ourselves. Now our heritage is threatened anew.

Naughton, McIntyre and Santanoni, the three gemlike lakes of Avalanche and Coldon and the Flowedlands, and the Indian Pass running from Lake Henderson northward to Lake Placid.

These reserves have been used and enjoyed each year by thousands of campers, mountaineers, hunters, fishermen and skiers, for there have always been trails and simple lean-to shelters in the Forest Reserves. But these and the similar reserves up to the present time have been protected by the amendment of 1894 against exploitation and commercialism.

In comparison with the total area of New York State, these protected regions are very, very small. Nevertheless, they have been kept as true wildernesses and they have served the State well as reservoirs for the wildlife that was once so plentiful everywhere. Here there are not only deer and bear, but mink, otter, beaver, fisher, marten, ruffed grouse, occasionally even the great pileated woodpecker. The superb forest streams are still unpolluted. There are no highways with billboards, neon lights, gasoline stations, Joe's Place, juke boxes — no tin cans, bedsprings, junked automobiles and old tires in the ponds and creeks.

The proposed Young-Reoux Amendment to the Constitution does not say that all these "blessings" of highway civilization will be superimposed on the wilderness of the Forest Reserves; indeed, it specifies that "no mechanical amusement device" shall be installed, and that there



shall be no "commercial exploitation." The amendment seems to propose merely that the State shall be allowed to erect and maintain "permanent enclosed buildings of use to the public for healthful recreation."

But permanent enclosed buildings — restaurants, hotels, over-night cabins, lodges of various kinds, service buildings—must be served by roads and plenty of them, and just as inevitable are gasoline filling stations to serve the roads. It is not even a question of how well the buildings and the filling stations and the eating places are maintained; under strict State management they might be dignified and well-run structures and services. At least in the beginning.

The quality of the installations that would be permitted is not the question at all.

Once the roads are cut, once the motorists swarm in, the wilderness is gone.

And the wildlife.

THERE ARE MANY PEOPLE who have a bowing acquaintance with Nature who neither know what the true wilderness is nor consider it of any particular importance. For the most part such people are quite content to regard mountain lake and forest scenery from a comfortable seat in a speeding automobile. They have had a good time if the scenery glides swiftly by and at the end of the journey there is a comfortable overnight cabin or a resort hotel, with inner-spring mattresses on the beds, running hot and cold water, reasonably good food and golf courses and tennis courts that are not too crowded.

These scenery lovers fully deserve to have their vacation requirements catered to. But not all people feel as they do.

There are many thousands of others whose interests and desires are not satisfied in just this fashion. To them, the mountains and the wilderness are a refuge, a source of strength, a source of spiritual replenishment.

By and large, the true wilderness lovers are willing to sweat for their enjoyment. They are the campers, the fishermen, the hunters, the mountain climbers, the hikers, the canoers, who know nature more intimately and love her more passionately than their brothers and sisters of the

resort hotels. By and large they treat Nature with greater consideration; they are more mindful of her protection. Is it too much to ask the rest of us to remember that these people have their rights, too? Or to realize that these rights will not last very long if either of the proposed amendments to the State Constitution are passed?

Many supporters of these proposed amendments will protest that it is not at all their intention to destroy the wilderness — and yet, if the amendments are carried, there will be nothing in the world to prevent a public dance hall from being erected or a mine shaft being sunk *in any part of the wilderness areas*. And there's the rub — there is *no restriction as to where* such buildings can be erected and maintained. It is the clear contention of this writer that there are certain areas in which no buildings ever should be erected, saving lean-tos; and through which no roads should ever penetrate, except trails.

If the amendments are passed and if twenty years from now your children, under the ever growing pressure of modern conditions, would like to escape for a few days and refresh themselves by camping out in the wilderness of Lake Avalanche beneath the frowning crags of Mt. Coldon on one side and the superb green flank of McIntyre on the other, they would quite likely discover that they could reach Lake Avalanche by a concrete highway and find upon their arrival, not peace and beauty and isolation, but a really first class hot dog stand where they could buy cold drinks and inexpensive cigars, and possibly rent an overnight cabin.

Even those who do not care very much for the primeval wilderness must realize that highways, automobiles, outboard motors, flying boats, gasoline stations, tennis courts — and resort hotels, even without "mechanical amusement devices," are and always will be brash intruders into the Silences. They are more than intruders; they are despoilers as well, and their presence is as out of place in the wilderness as a juke box would be at high mass in a cathedral. Man cannot live by the internal combustion engine alone, and if he attempts to do so he loses something which is very important and very fundamental to which it is hard to give a name. If he insists that others



When the wilderness is untouched — as it still is throughout the New York State Forest Reserves — our wild life still can find the peace and security it must have to survive.

shall do this, he is depriving them of something that is infinitely precious and something that is still the birthright of every American boy and girl who lives in our great State.

Many of the proponents of the Young-Reoux Amendment are entirely sincere in believing that these few remaining areas are not now being used to their full advantage and should be "opened up" so that more people can enjoy them. They are also apparently convinced that more highways and resorts should be built within these areas to insure "the greatest good for the greatest number." No one can quarrel with this last desire, if it truly is their desire, but we can and we must quarrel with the means which they are recommending in order to achieve it.

In the first place, no such amendment is needed to increase the recreational facilities of the Adirondacks and Catskills, for there are already roughly 3½ million acres of privately owned land in the Adirondacks, and approximately 350,000 acres of privately owned land in the Catskills which can readily be developed into cabin colonies and resorts. If such development is required, almost four million acres are available now.

In the second place, the proponents of the Young-Reoux Amendment tragically fail to recognize that by attempting to meet the problem as they have, they are writing off to destruction the last remaining wilderness areas and game reservoirs in our State.

Sincere as many of the proponents are, they will be supported by all the mining interests; by every local road contractor who can see a profit for himself in the business; and by hundreds of commercially-minded individuals who are avid for every kind of concession, from hot dog stands to ski tows. In short, the Young-Reoux and the Graves (mining) Amendments will be supported by everyone who can see a dollar's profit for himself and who considers the dollar more important than the sanctity of the wilderness.

If certain areas within the State's preserve should be developed for specific recreational purposes, and if they can be developed without threatening the wilderness, then let these areas

be specifically described by the language of the Young-Reoux Amendment so that we may know exactly what we are voting for. As the amendment stands today we do not know this, for it carries with it a blanket grant of power which is as unwise as it is unnecessary.

The Conservation Commissioner of New York State, Mr. Perry B. Duryea, has issued a very thoughtful statement on this whole question in which he urges a most reasonable and temperate proposal. He says, "In my opinion the time has come for another comprehensive, thoughtful, forward looking study such as the Legislature caused to be made in 1884. The demand for outdoor recreation such as the Forest Preserve can provide has doubled and trebled many times in these 62 years. That it is still increasing by leaps and bounds is evidenced on every hand. How to provide for a greater recreational development of the Forest Preserve and still retain its 'wilderness' character is a challenge which I believe calls for the best minds we can summon. If it is determined that further development, beyond present constitutional limits, is necessary, I feel it should involve zoning to continue complete protection for certain truly wilderness areas, and the drafting of other carefully thought-out safeguards.

"For what it may be worth, I shall therefore suggest to the leaders of the 1947 Legislature, and to the chairmen of its Senate and Assembly Conservation committees that a carefully selected commission of legislators and outstanding citizens be created to make such a study for the guidance of our people in considering these amendments. Any slight delay which may result is surely more than justified when we consider that we are dealing with the people's greatest single tangible possession. The time has come to stop hacking at our Constitution, chipping off or adding on a bit here and there—and to build a plan for our Forest Preserve which takes into consideration all of the predictable recreational demands which can properly be met in a wilderness environment."

It is hard to understand how any sincere person with knowledge of the facts can quarrel with the Commissioner's statement.

Thirty-one Years With Snakes

By WILLIAM BRIDGES

YOU WOULD EXPECT a lot of exciting things to happen to somebody who has been working with snakes for thirty-one years.

They have, all right. But the two most terrifying experiences in Fred Taggart's life didn't have anything to do with snakes.

He was scared by a Yak and by an Elephant.

Fred Taggart has been Head Keeper of the Reptile Department since 1941, and before that a keeper in the Reptile and Mammal Departments under the late Dr. Raymond L. Ditmars since 1916. He started as a relief man — substituting for keepers in various buildings when they were away. Thus it was that Dr. Ditmars called on Fred, instead of the regular attendant, one day when he wanted to make a motion picture of a bull Yak goring a sack of hay.

Dr. Ditmars stood on the roof of the Yak House, camera all ready; all Fred had to do was to enter the Yak enclosure, attract the attention of the bull, throw down the sack of hay — and get out of the way.

It worked just as the script said, except that the Yak charged Taggart instead of the hay. It caught him from behind, and he fell backward over the infuriated

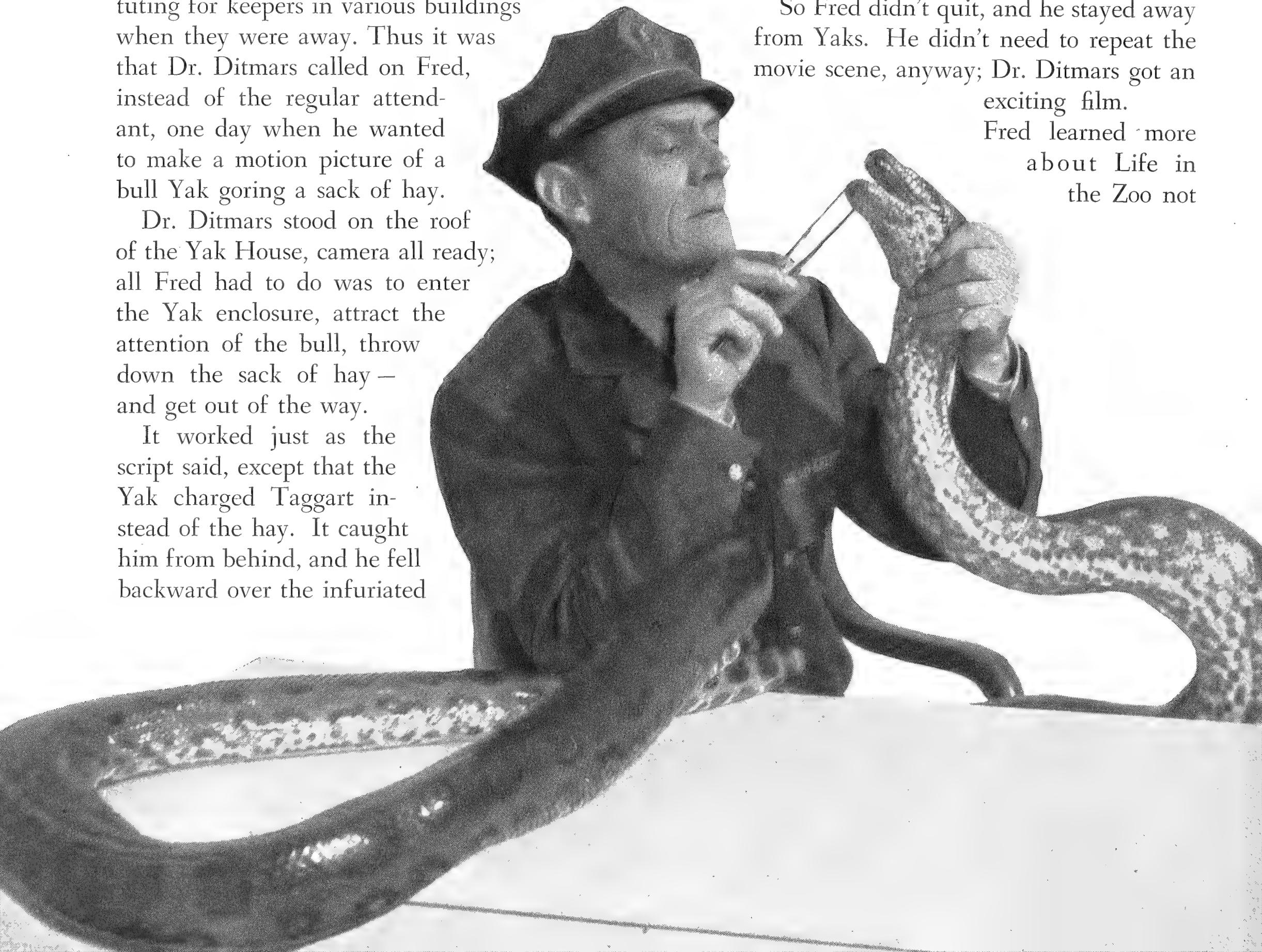
animal's head, between the horns. He managed to turn and lie on his stomach, hanging onto the horns for dear life. The Yak carried him all around the corral for several minutes. Then, all of a sudden, the animal stopped. Fred got off, leaped for the fence, and ran all the way home.

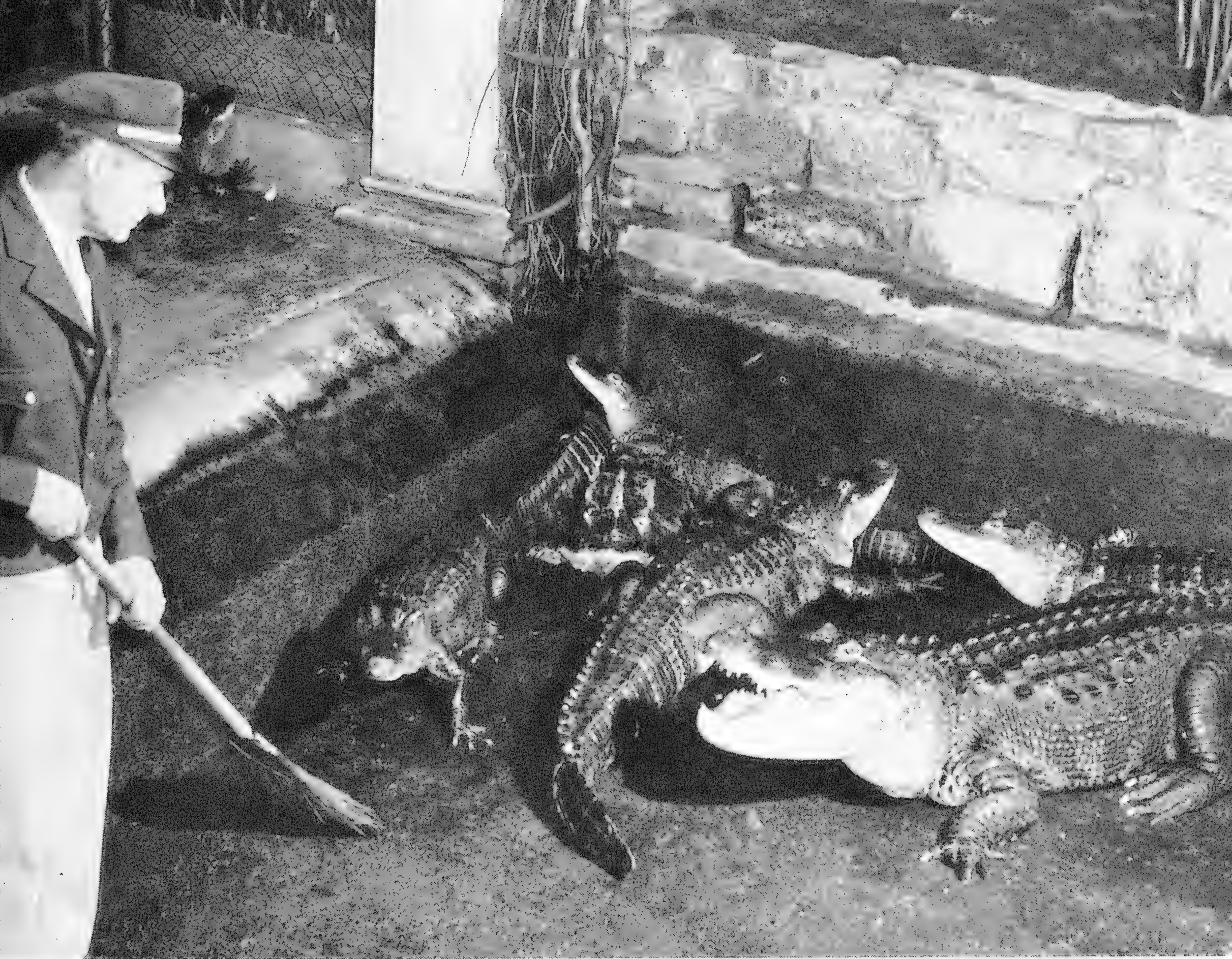
"I'm quitting," he told his bride of four months. "I've just been ridden all over the Zoo on a Yak."

"I don't know what a Yak is," Mrs. Taggart said, "but you're not quitting. Just you stay away from Yaks."

So Fred didn't quit, and he stayed away from Yaks. He didn't need to repeat the movie scene, anyway; Dr. Ditmars got an exciting film.

Fred learned more about Life in the Zoo not





A good many of Head Keeper Taggart's duties around the Reptile House look dangerous, and some of them really are. This one—of cleaning the Alligator Pool—is only potentially perilous; as long as Taggart moves cautiously and keeps his distance, everything is safe.

long afterward when he took over a relief job in the Elephant House. Keeper Dick Richards thrust a broom in his hands and told him to go into Alice's stall and sweep out — Alice being the big Indian Elephant.

"I was sweeping away and all of a sudden a trunk curled around my waist and Alice lifted me about eight feet in the air, broom and all," Taggart said. "I screeched, and there's Richards outside the cage, laughing his head off."

"'She wants a drink. Turn on the hose for her,' he says. With that, Alice sets me down by the watering trough. I guess I turned on the hose; I was as weak as water myself. Richards knew all the time Alice was going to do that — it was a trick she'd learned. She didn't mean any

harm. But I can still feel that trunk around my waist, and going up in the air."

After Yaks and Elephants, working in the Reptile House and handling Cobras, Rattlesnakes, Gaboon Vipers and Water Moccasins was a snug cinch. Fred knew the dangers of his job — he got it in the first place because John Toomey, the Reptile House keeper, had been bitten by a Diamond-back Rattlesnake and the staff was short-handed. Later he was to be a pall-bearer at the funeral of Charley Snyder, Head Keeper of Reptiles, who died from the bite of a Timber Rattler in the Ramapos. Fred was always careful — except once.

"I'd been taking the scales off the eyes of a Copperhead and instead of throwing it away



Reptiles often require “fussing” — special efforts to induce them to feed. The Head Keeper has been supervising the meals of a Beaded Lizard; now it takes its raw eggs by itself.

This is a job that (fortunately) comes only once a year — making a census of the entire reptile collection. But the turtles at least stand still long enough to be counted by species.





Dr. Ditmars taught Head Keeper Taggart how to “milk” the venom of a poisonous snake safely and quickly. Nowadays we seldom extract venom, except to demonstrate the technique.

The Reptile House has a fascination for amateur photographers, perhaps because they seldom have an opportunity to photograph snakes safely. Taggart always produces a big one.





As a very necessary protection, Taggart puts on a mask before handling the Spitting Cobra.



“Ordinary” Cobras are no problem — just keep well away from them while cleaning the cage!

from me, when I let go, I just dropped the snake,” he said. “So it upped suddenly, and caught me on the thumb. Dr. Ditmars took me over to the Hospital, they gave me two vials of serum, and I was back at work in two weeks. That taught me to throw snakes away from me when I let go of ’em.”

For years Fred was the Zoological Park’s emergency man, subject to call at any hour of the day or night when the police encountered some ferocious wild animal (generally a Raccoon) or some deadly snake (usually a Garter-snake) within the city limits.

But his most outlandish experience occurred once when a Chimpanzee named Sue had a baby. The baby died, but Sue refused to give it up.

After several days the situation became unbearable; Sue *had* to be made to surrender the body of her defunct offspring.

Keepers could not get near her, but Dr. Ditmars had noticed that the Chimpanzee once seemed to offer the baby to a woman visitor.

So he dressed Fred in skirts, ostrich-plume hat — and veil.

“Sue took one look at me and spit in my eye,” said Fred.

They fired blank cartridges to frighten Sue but that didn’t work. Finally they turned six tiny tortoises loose in the cage. Sue yelled, dropped her baby, and fled.

“Anyway, it proves I’m not as homely as a turtle,” was Fred’s comment.

Report of Progress

By **DONALD T. CARLISLE**
Chairman, Membership Committee

IF YOU ATTENDED our 51st Annual Meeting you heard about it then. Or perhaps you read of it in the papers. At any rate, the New York Zoological Society will shortly receive the biggest single gift in its history, being a share in the trust estate of Mr. Clark Williams, who died in December of last year, this estate having been established through the will of the late Mrs. Frederick Ferris Thompson, a former Benefactor of the Society. The bequest amounts to approximately \$2,500,000. President Osborn at the Annual Meeting reported not only this great benefaction but was further able to announce that in 1946 there were additional gifts and pledges to the Society totaling \$282,000.

Coming at this time, when the Society is reaching forward to so many important objectives, some of our friends may think that these superb gifts will meet the greater part of our need for additional funds. Such is decidedly not the case. We have known for a number of years that this legacy would come to the Society and as a consequence its influence on the Society's financial affairs has long since been discounted. The use of a part of this truly magnificent gift will now enable us, among other things, to provide adequate pensions as well as to add certain personnel essential to the successful operation of our institution. It will further permit the Society to initiate the primary steps in far-reaching activities having to do with the conservation of natural living resources. There will be very little, if anything, left over for actual expansion into new fields. The need for new capital—for a new Aquarium, for a properly developed Conservation

program, for the modernization of the Park, for the expansion of work in research—is just as great as it was before. The Society still requires at least \$5,000,000 to accomplish these vital purposes.

It would do the Society great, perhaps lasting, harm if any of our friends were to think that we are content with what is naturally an improved but by no means a perfect set of working conditions. We *are* making progress, but this progress extends back many years into the past. We take the view that if the Society's program justified so great a legacy in 1923, when Mrs. Thompson died, it is even better qualified for additional substantial assistance now.

Hence, we are proceeding as we have these past two years—endeavoring to create new friends for the Society, and trying to cement our friendships by making the Society's privileges more valuable and interesting.

The membership goal we seek has not yet been reached but we have made the greatest gain in our friendships this year that has occurred in any like period in our history.

According to the Annual Report for 1944, the Society had only 858 annual members at the time our drive was started. Our life memberships that year totaled 297. In 1945 we added 536 new annual and 26 new life members—a gain of 62%. This was a record up to that year. In 1946, however, 833 new annual and 42 new life members joined our ranks and the Society now is almost back to the highest membership it has ever had.

This is a gratifying but not a startling result. We have worked hard to gain this new interest in our work. The times have not been as propi-

tious as they might be, and many other institutions are seeking new adherents, too. We shall not relax in this effort any more than we shall slacken our pace toward any other of our many goals.

The aims of your Society are high. There are many, many more people who will appreciate them when they know them. It is a matter of finding who and where these people are, and then of telling them our story. The Zoological Society should have a membership of at least 5,000 people. Some of our friends tell us it can be far larger than that. At our present rate of

gain we can reach 5,000 members in another two years.

It will again require the help of our many loyal friends to reach this goal. In 1945 they gave us a truly magnificent support. Last year once more they rallied to our call for help. We feel sure they will respond as willingly in 1947.

We do not wish for size merely to be big, as President Osborn has often pointed out, but the Society can be so much more effective in the pursuit of its many projects if behind us we have the moral force of all the people who believe in these objectives.

New Members of the New York Zoological Society Since the last issue of *ANIMAL KINGDOM*

FOUNDER

Winthrop Rockefeller

LIFE

R. R. M. Carpenter
William K. Carpenter
William R. Coe, Jr.
Heyward Cutting
Miss Adelaide H. C. Frick

George Ronald Furse
Charles V. Graham
Mrs. H. T. Lindeberg
Miss Helen Menken
Mrs. Roland L. Redmond
George N. Richard

Mrs. Laurance S. Rockefeller
William M. Roth
Miss Anna Lord Strauss
James Willcox
Master Brant Rex Wilson

ANNUAL

Dr. Warren S. Adams
Horace M. Albright
Miss Lucy T. Aldrich
Philip K. Allen, Jr.
Dr. Harold L. Alling
Mortimer J. Altshuler
Jack R. Aron
Mrs. Max Ascoli
Mrs. Reginald L. G. Auchincloss
Charles F. Ayer
George Backer
Miss Katharine Backes
Miss Mabel E. Bagger
John T. Barber
Thomas H. Barber
George N. Barrie
Miss A. I. Bauman
Mrs. Hugh H. Baxter
Randolph H. Beardsley
Miss Marie F. Becker
George J. Beldock
F. Wilder Bellamy
Miss Marjorie Flock Benet
George Tucker Bispham
Miss Rosanne Blair
Mrs. S. M. Boosin
A. E. Booth
George A. Braga
Mrs. George E. Brewer, Jr.

Miss Diana Brewster
Miss Cornelia Clifford Brown
Warren D. Brown
Gilbert G. Browne
Miss Audrey Bruce
Jere D. Buckley
David T. Bulkley
Mrs. David Tod Bulkley
Irving H. Burnside
John H. Burton
Meyer Camhi
Dr. Eleanor A. Campbell
James R. Chamberlain
Fred D. Chambers
John P. Chase
John P. Chase, Jr.
Dr. and Mrs. Miles Chelimer
Miss Mabel Choate
Donald R. Clark
Dr. Arthur W. Cleaves
Alfred S. Cleaves
S. R. Cleland-Scott
William P. Clyde
Mrs. Calvert Coggeshall
John M. Conklin
Albert R. Connelly
Mrs. William H. Conroy
Howard Coonley
H. K. Corning

J. Cheever Cowdin
Mrs. John W. Cross
John Currie, Jr.
Francis B. Davis, Jr.
Jacob De Boer
Mrs. C. C. deGersdorff
Miss Alice De La Mar
Donald H. DeMeules
Mrs. John M. Dickinson
C. Douglas Dillon
Mrs. Barclay Douglas
Lawrance B. Dunham
Mrs. W. A. Edgar
Mrs. John Worth Edmonds
Mrs. Wilbur Dixon Ellis
Victor Emanuel
Charles C. Fagg
John Farr
Mrs. Marshall Field, Jr.
Miss Beatrice Fisher
Horace C. Flanigan
Donald Lee Flexner
John Fraser
Wilfred Funk
Paul H. Gadebusch
James W. Gaffney
Lieut. Col. Kenneth Gardner
Mrs. Paul E. Gardner
Charles I. Garside

Mrs. John M. Gates
 Mrs. H. C. Gayley
 Robert M. Gaylord
 Mrs. Langdon Geer
 Mrs. Leo Gellert
 Miss Jean Gengler
 Mrs. James W. Gerard
 Mrs. Harvey D. Gibson
 Morrill Goddard, Jr.
 Mrs. Robert W. Goelet
 Mrs. Carel Goldschmidt
 Joel L. Goldschmidt
 George W. Goman
 Miss Noel Graeber
 Miss Leigh Graham
 William T. Grant
 Arthur Gray
 George L. Green
 Albert H. Gregg
 William V. Griffin
 Master Robinson A. Grover
 Benedict H. Gruntal
 Mrs. Helena W. Guest
 Mrs. R. M. Gunnison
 S. Thomas Haffen
 Mrs. Harbeck Halsted
 S. C. Hamlin
 Charles J. Hardy
 Duncan G. Harris
 John W. Hart
 Joseph Havender, Jr.
 Evan B. Hazard
 Mrs. Norbert Heinsheimer
 Dr. Edward Henderson
 Mrs. Thomas D. Hewitt
 Dr. Howard R. Hill
 Mrs. Frederick W. Hilles
 Miss Martha Hird
 Miss Mary E. Hird
 Samuel Hirshenhorn, Jr.
 Mrs. Ethan A. Hitchcock
 Carlos S. Holcomb
 Harry B. Hollins, Jr.
 Mrs. Elon H. Hooker
 Fraser M. Horn
 Mrs. Howell Howard
 Jim Hurley
 William F. Irwin
 Leon Israel, Jr.
 Mrs. Bayard James
 Harold A. Jason
 Miss Mildred L. Johnson
 D. M. C. Johnston, Jr.
 Louis Paul Jonas, Jr.
 Adrian D. Joyce
 Eph A. Karelsen
 Arthur H. Kehoe
 Carl T. Keller
 Miss Adaline B. Kelly
 Richard Kelly
 Gardiner Kline
 Mrs. S. Adolphus Knopf
 Elmer LaFlamme
 Mrs. William F. Lamb
 Mrs. John A. Larkin

Miss Jean Lawson
 Mrs. Harold M. Lehman
 Mrs. Robert J. Lewis
 Mrs. Joseph L. Lilienthal
 Samuel Lipman
 Alvin W. Littwitz
 Luke B. Lockwood
 Mrs. Frederic W. Lord
 Leo Lowenstein
 Harry I. Luber
 Storer Lunt
 Miss Ruth Lyon
 Alonzo K. Marsh
 Miss Edith G. Marshall
 H. Bradley Martin
 Miss Mary Mastin
 Mrs. Flagler Matthews
 Mrs. Lawrence G. McCann
 Gilbert S. McClintock
 Mrs. John J. McCloy
 George W. McIver, Jr.
 Robert E. McKee
 Charles S. McVeigh
 Irving H. Meehan
 Walter Henry Merritt
 Arthur S. Meyer
 Mrs. G. Macculloch Miller
 Ranlet Miner, Jr.
 James L. Mitchell
 J. Murray Mitchell
 Samuel W. Meek
 Mrs. Frank W. Moffett
 Mrs. A. Henry Mosle
 Theodore Murin
 Carl E. Newman
 Howard M. Newton
 Mrs. Francis T. Nichols
 Gustav Nyselius
 Michael Ochis
 W. E. Ogilvie
 Samuel H. Ordway, Jr.
 Mrs. Frederick Osborn
 Frank R. Outerbridge
 Dr. Russel H. Patterson
 Mrs. Williamson Pell, Jr.
 Col. Leopold Philipp
 Sumner Pingree, Jr.
 Miss Lily Pons
 Miss Rachel H. Powell
 Mrs. John C. Powers
 Theodore Prince
 Mrs. Morris McKim Pryor
 Frank J. Putallas
 Gordon Regan
 Cornelius J. Reid
 Walter E. Remmers
 Miss Karen Rick
 Robert L. Ripley
 Alfred L. Rose
 Paul Rosenthal
 Mrs. Walter N. Rothschild
 Mrs. H. D. Ruhm, Jr.
 Princess J. Eugenia Ruspoli
 Frank F. Russell
 Miss Margaret C. Sanderson

Hugh Satterlee
 Henry B. Schaefer
 Mrs. Gustave H. Schiff
 Reeve Schley
 Master Jay A. Schmitz
 F. Schneider
 Pierre L. Schoenheimer
 Mrs. Quentin Melling Schubert
 Mason Sears
 Mrs. Beatrice Shanok
 Edwin F. Sherman
 Frank A. Sieverman
 Herbert M. Singer
 J. Hopkins Smith, Jr.
 Gustave J. Soderberg, Jr.
 Ray Newhall Spooner
 Samuel Stacey
 Mrs. Robert C. Stanley
 Robert James Steenweg
 Vilhjalmur Stefansson
 Dr. DeWitt Stetten
 Mrs. L. G. Phelps Stokes
 Charles H. Stoll
 Mrs. F. Courtney Stone, Sr.
 Gardner D. Stout
 Jerome A. Straka
 Mrs. Walter Knight Sturges, Jr.
 Alan R. Stuyvesant
 David V. Sutton
 William Sydor
 Mrs. Rush Taggart
 Mrs. Henry C. Taylor
 Mrs. William H. Taylor
 Mrs. John S. Thacher
 Thomas Thacher
 N. K. G. Tholand
 Miss Ruth Thompson
 Oakleigh L. Thorne
 Hugh M. Traphagen
 Mrs. John Tucker
 Mrs. Gene Tunney
 Master Andrew Ullman
 Mrs. John P. Upham
 Miss Helen Van Norden
 Mrs. Henry G. Vaughan
 Master William Miles Vogel
 Miss Ruth Volkmann
 Mrs. F. Skiddy Von Stade
 Oscar Wagner
 Miss Elizabeth Walker
 David Warburg
 Mrs. James P. Warburg
 Sylvanus D. Ward
 Ethelbert Warfield
 Mrs. Sylvan E. Weil
 George W. Whitaker
 Peter White
 Mrs. Clark Williams
 Miss Isabel Wilson
 Wheeler Williams
 Cornelius Ayer Wood
 Mahonri M. Young
 Herman Younker
 Philip Zahn

Pere David's Deer

(Continued from page 5)

became established in several zoological gardens, as is indicated by scattered records in the *Bulletin* of the Société d'Acclimatation de France and the *Proceedings* of the Zoological Society of London. Births are mentioned as occurring in Berlin, Paris and London in the 'Eighties and 'Nineties, with observations that the fawns are small, considering the size of the adults; that they are spotted, and that the animals are totally indifferent to cold.

A fearful disaster, meanwhile, overtook the unique herd in China. After centuries of preservation in the Imperial Park, the whole population of Père David's Deer was slaughtered in 1900 by the western allied troops which had invaded Peking. German soldiers, quartered in the Park, killed all the deer and sold the meat to the populace. The species was thus wiped out in its country of origin where it had been kept alive so long through very special measures of protection.

After some initial success, the Père David's Deer population in Europe dwindled to a few head. The species is intolerant of close quarters and needs vast space if it is going to prosper. Finally only seven of the deer remained, dispersed among several zoos; four head were in the Jardin d'Acclimatation in Paris.

Alarmed by the threatened extinction of a unique animal, the Duke of Bedford succeeded in purchasing all the remaining specimens with the hope of propagating them under the almost perfect conditions that obtained in his large park at Woburn Abbey.

The beginning was difficult. Only one male and two females proved able to breed. After a time it was found that the deer did not do well in "small" enclosures of 50 to 100 acres and they were liberated in the great park of some 4,000 acres, already inhabited by large herds of Red, Fallow, Dybowski's, Axis and Hog Deer, innumerable birds and many other mammals.

When they were permitted to roam at large with access to lakes and wallows (which they need), they increased in numbers rapidly. When I first saw them, in 1910, there were nearly 100 head. After 1920 they worked up to 300. Despite difficulties, the herd still numbers about 250.

The rutting season comes during the summer, in July and August, and the fawns are dropped late in the following spring.

For many years the stags dropped their antlers twice a year, an abnormality probably due to very rich and abundant food. The result was smaller antlers. Today they have reverted to one shedding a year, in the late fall. In October of last year, when I last saw them, most of the stags still carried their antlers. Like all deer except the Reindeer and Caribou, the females lack antlers.

Père David's Deer stags fight a good deal in the breeding season but they totally ignore the other species of deer in the park at Woburn Abbey, such as Red and Fallow Deer.

I have watched the deer at Woburn on numerous occasions and I am still convinced that no other such display can be seen anywhere on earth. It is comforting to know that the present Duke has decided to keep up this wonderful collection which he is supervising with the same unusual competence and knowledge of wildlife which his late father and mother showed. The Duke is well aware of the potential danger of keeping the total population of Père David's Deer in one park, as was demonstrated by the tragedy of Peking in 1900. He therefore decided to let the Zoo at Whipsnade and a few other establishments in England have some specimens. The animals coming to us in New York were captured as fawns at birth last spring and were reared by goats at Whipsnade. Coming here, they were under the care of F. E. Fooks, the director of my own park at Clères in France. It is planned that other specimens will follow next year.

These young deer, the first of their species ever to be exhibited in America, will be liberated in one of the largest enclosures in the New York Zoological Park. When the herd increases, it is hoped that it can be settled in a large, fenced park in the vicinity of New York. The climate here is closely similar to that of North China. It would seem that the species can become as well established on this side of the Atlantic as it has been in England. There is no better way in which our Zoological Society can contribute to the preservation and increase of one of the rarest and most interesting species of the animal kingdom.



Binocular microscopes are designed for human eyes—not for the multiple facets of insect eyes. So it is doubtful if the curiosity of this Mantis will be satisfied, no matter how studiously it peers into the lenses.

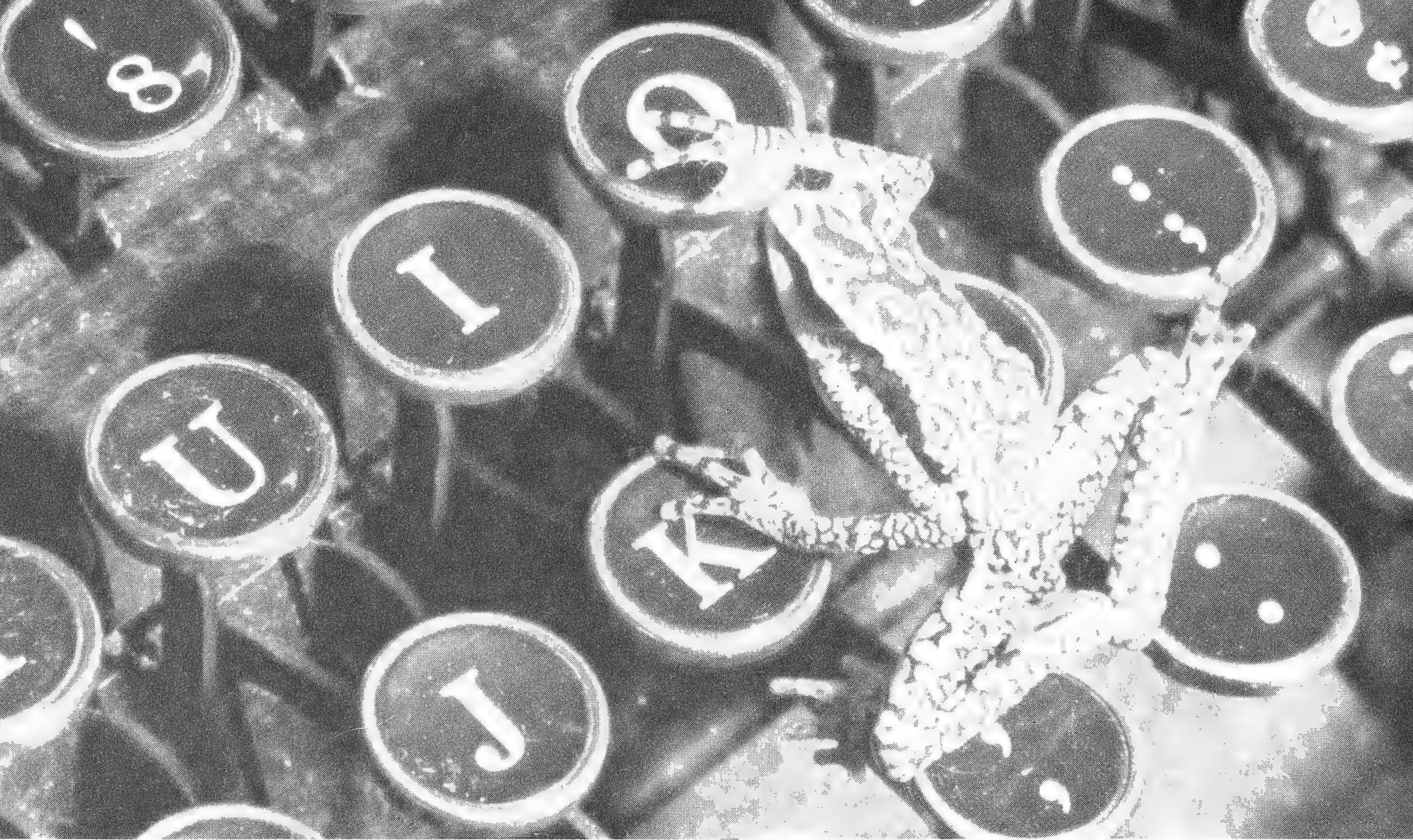
What Happens

When Jungle Animals Take Over

IN PITTING OUR SENSES against those of the wild creatures which we are studying at the Tropical Research Station at Rancho Grande in Venezuela, we strive always to conceal the fact that we are human beings. We jump into fox-holes or observation pits, thus bringing our eyes down to ant level; we lie astride a low branch and pretend to be an inhuman mass of foliage; we pursue and run down our prey or entangle it in nets. Best of all, whenever possible, we compel our unconscious but shy quarry within optical arm's reach with giant binoculars.

By **WILLIAM BEEBE**

We bring many within the laboratory and pry into their private lives, persuading them to carry on their courtships, lay eggs, change color, and accept or reject certain significant foods. They soon lose fear, feed from our hands, and permit us to do inexplicable things, such as placing a tiny but full-grown mouse opossum on one arm of the scales and a hercules beetle on the other, the insect outweighing the mammal by five grams.

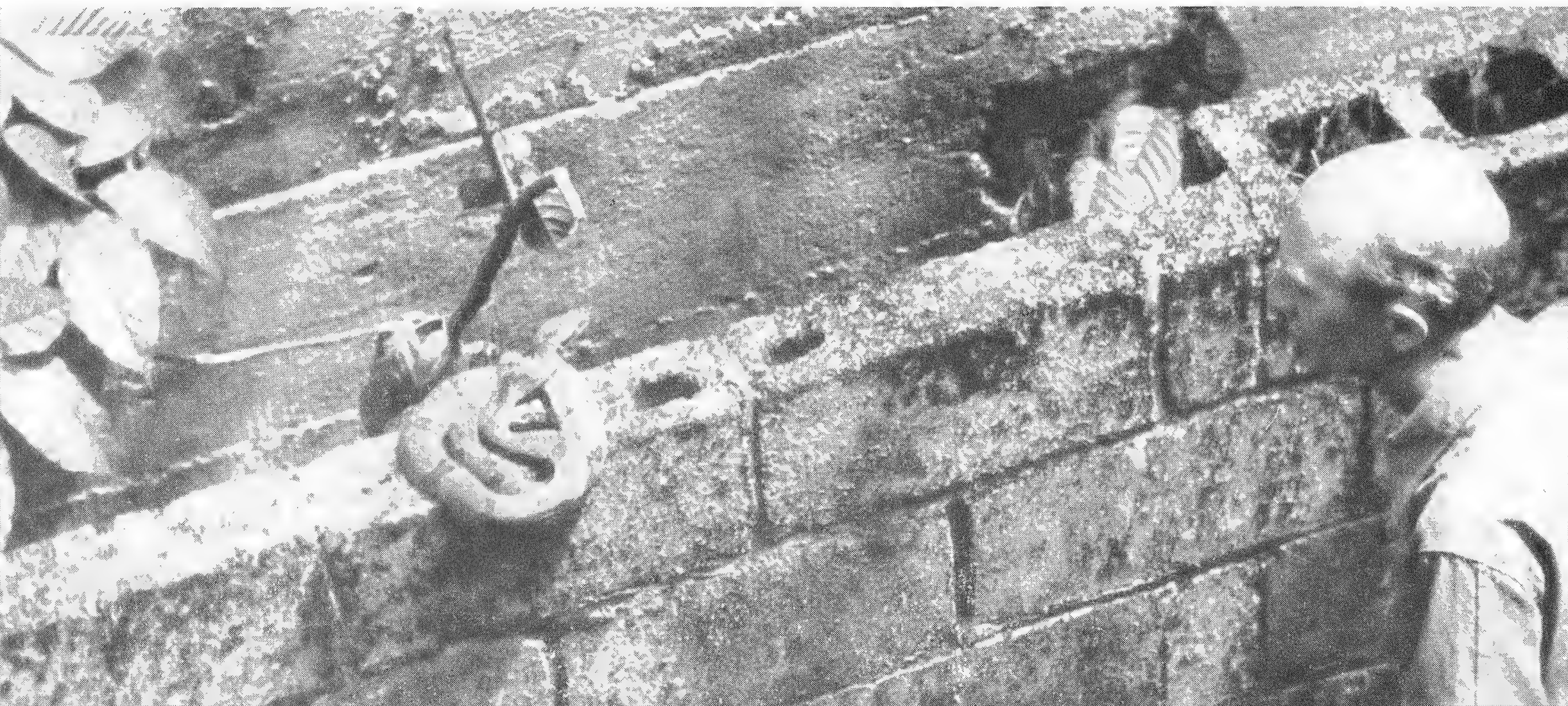


A FROG WANTED TO LEARN TYPING . . .

At night when the lights go out in the laboratory and we strange humans trudge upstairs to bed, funny things begin to happen, the various beasts and reptiles and insects become restless and many try to escape from their comfortable homes. In the morning we miss them and they may appear suddenly on clothing or instruments. I reached for my microscope one day and aroused the belligerent resentment of a great emerald

mantis who seemed determined to gaze down the instrument, hoping perhaps to see one of us on the stage and to cast some light on the reason for our existence. A mantis is so completely uninsect in its utter fearlessness, and so human in the turning of its head and embarrassingly concentrated stare, that a reversal of our relationship would be far less surprising than in any other creature.

A FER-DE-LANCE SIMPLY MOVED IN . . .



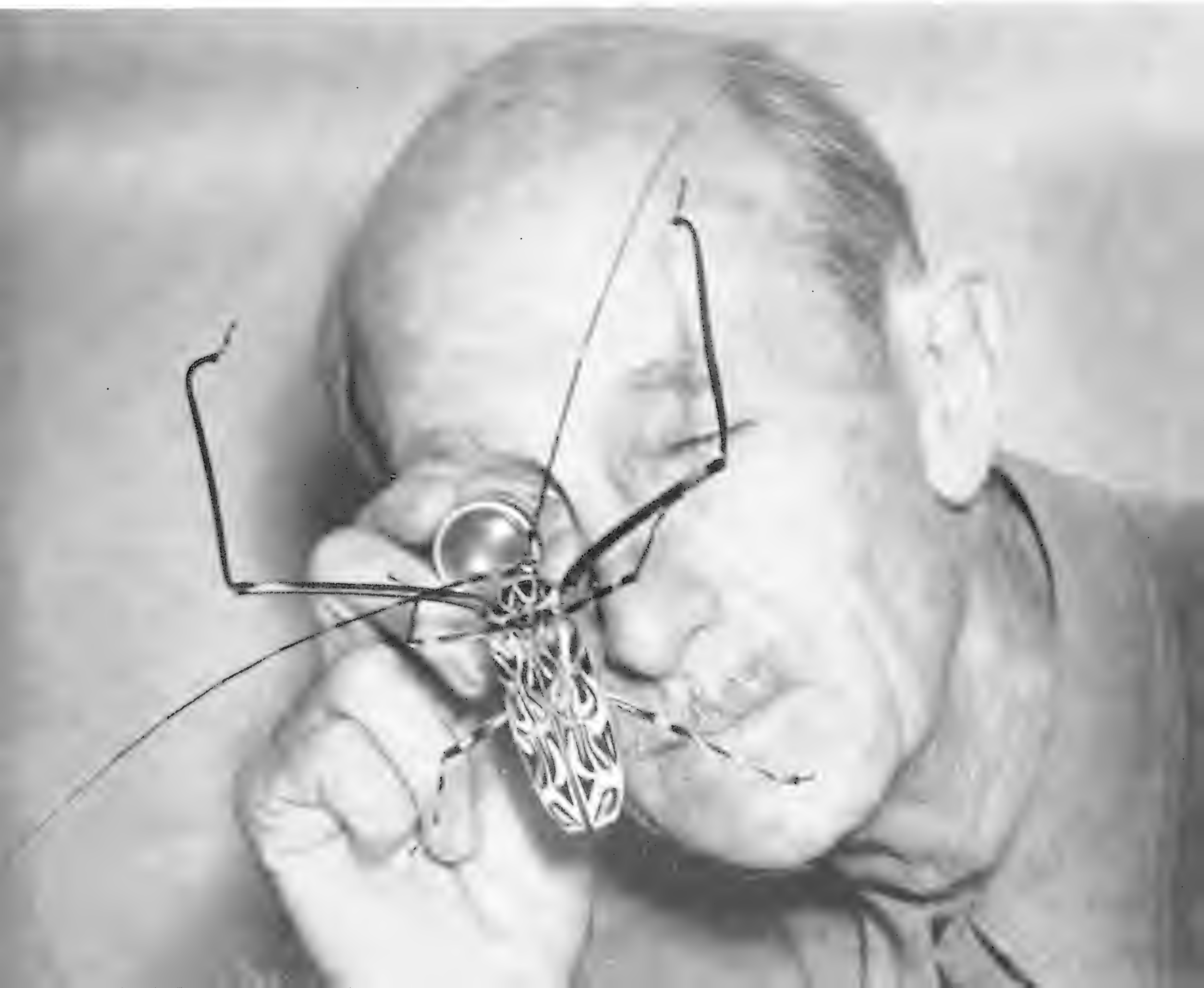
Several green and black *Atelopus* frogs escaped (perhaps the very ones now living in the Reptile House in the Zoological Park), and when Jocelyn Crane uncovered her typewriter, from nowhere in particular a frog leaped through space and landed on the keys, with his small clammy hands firmly on the letters O K. Like "Archie's," any amphibian-typed communication would have to be in the lower case. It is difficult to study the under side of the head of any undisturbed insect, except when moths and beetles come to light, and cling to our glass windows. At such a time, with a hand lens, it is possible to see and observe the workings of all the most intimate features of even the largest long-horned beetles. It is an instructive pastime.

Some of our escaped refugees provide more serious excitement. A large coral snake once lifted twenty pounds of terrarium cover, oozed

out, and for a week became as though it never had been. One night at midnight I came down in the dark to see if our marsupial frogs were "expecting." I trod on a loose bit of rope which rolled beneath my feet, and before I could unlimber my flashlight I broke the world's record for a sidewise leap.

Again and again in the weird, unfinished portions of Rancho Grande, we realized how completely our castle is immersed in the heart of the jungle. On rainy days we wander through the scores of doorless rooms and corridors and never come back empty-handed or without notes dealing with a diversity of creatures gamuting from jaguars and vultures to peripatus and hydras. On sunny days an occasional fer-de-lance would creep out from the ruins, like Kaa in her ancient palace, and warm her hour-glass markings, her flat head, her evil Mongolian eyes, and,

INSECT OUTSIDE, SCIENTIST INSIDE; MUTUAL ATTRACTION

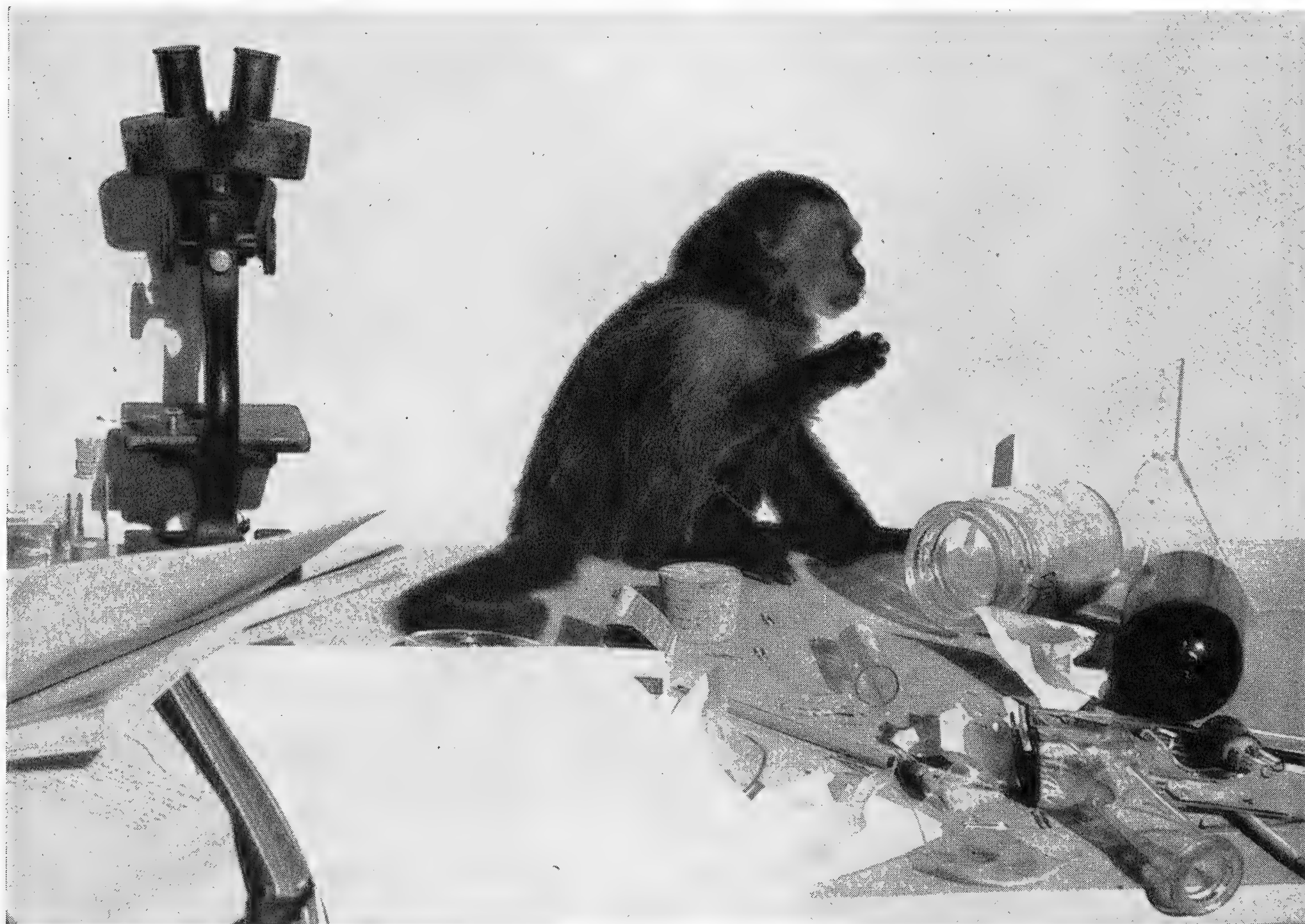


in one case, the thirty-eight, seven-inch fer-de-lancelings within her body.

On our expeditions we are never without a Chiri; alias Capuchin Monkey; alias Chiriqui, Cheerio, Cherubim and Chirimoya. They become members of our staff, they become official tasters and unofficial eternal time-wasters. They wind deep into our affections and finally break our hearts when we have to leave them. We know both the sweet and the fiendish sides to their little souls, and our first rule is never to leave them at liberty when we are away. But their gray matter occasionally rises to banderlog genius heights and they solve lock or bolt or knot and step forth into the laboratorial expanse in as full freedom as Marster himself. From this point on they have a single ideal—to reduce everything within reach to its primitive elements. On the *Arcturus* what Chiri did to the cabin shared by the girl artists became a classic and an epic whose details never needed embellishment.

On the latest occasion at Rancho Grande a single shelf caught the little primate eyes, and was selected as the Bikini of effort. Books were pulled out and opened, and how! Vials and jars of unusual strength were shattered. To a foundation of cotton, arsenic, pinned insects, glue and ink were added jiggers of chemicals to form devils' cocktails. Never is Chiri poisoned. He can fashion hell-broths but he always leaves them untasted.

Throughout all this wilful destruction the little imp is actuated by no innocent excess of energy or ego. He *knows* he is doing what, at least in our minds, is most wicked, for the moment one of us appears a fearful shriek goes up. His whole mind and soul is torn between improbable propitiation and most certain retribution. Feeble hints of affectionate gestures are, in their very inception, relinquished as hopeless. He flees to the most distant corner, turns to the wall, and, still shrieking, awaits his destiny of inevitable punishment.



AND WHEN A MONKEY TAKES OVER, THIS IS WHAT HAPPENS

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Animals for England

The first large shipment of animals abroad that we have made since the war left New York on January 16 for the London Zoological Garden, the Paris Zoo, the Clères estate of Jean Delacour in France, and one or two private collectors.

Most of the birds and mammals were shipped by the Zoological Society "on account," in payment for exchange animals we have received from abroad or, in the case of the London Zoo, to help balance our account for the care and shipment of the Père David's Deer, the Chinese Water Deer and a Formosan buck received from London in December.

Our return shipment, of seventeen species of birds and three mammals (Agoutis, Kinkajous and White-tailed Deer), was made on the *America* of the United States Lines, in the care of Mr. Frank Fooks, superintendent of Mr. Delacour's estate.

"Bounty" Article Reprinted

There have been so many requests from conservationists all over the country for copies of "The Bounty System Doesn't Work," by Dr. W. J. Hamilton, Jr., that the article has been reprinted from the July-August, 1946, issue of *ANIMAL KINGDOM*. As long as the reprint edition lasts, we will be glad to send copies to new members of the Society who are particularly interested. Just write to the Publication Office at the Zoological Park.

It's Display Time

This is the best (indeed, the only) time of the year to see the display of various species of Birds of Paradise in the Main Bird House. The Long-tailed, Greater Six-plumed and Magnificent Rifle Bird are displaying almost daily, although at unpredictable times.

Dr. Nigrelli Elected

Dr. Ross F. Nigrelli, pathologist of the Aquarium, has been elected a Fellow of the Royal Society of Tropical Medicine and Hygiene of London.

He has also been reelected vice-president of the biology section of the New York Academy of Sciences, and continues in charge of the organization of symposia in the fields of medicine and the biological sciences.

Duck Hawk Migration

An interesting note on the long migration of the Duck Hawk has been sent us by Col. R. Luff Meredith, a Member of the Zoological Society and a well-known falconry enthusiast.

"I banded two young Duck Hawks in Tunugliarfik Fjord, Greenland, in August, 1941," he writes. "One of them was found dead, presumably shot, at Cienfuegos, Cuba, on December 2, 1941. Another long distance return on a banded Duck Hawk was on one banded as a passage bird October 10, 1939, on Assateague Island, Maryland. It was killed November 10, 1944, in Bolivia."

* * *

Dr. Myron Gordon, research associate of the Aquarium, presented two papers on fish genetics at the meetings of the American Association for the Advancement of Science at Boston during the Christmas-New Year's holidays.

* * *

Charles Cordier, the Zoological Society's bird collector, has reported from Guatemala that he now has an interesting and important collection of birds for us, and is almost ready to sail. He is likely to arrive in New York early in February.



THERE WAS ALWAYS A NEW WAY TO CLIMB.



HANDS AND FEET WERE EQUALLY AGILE.



JUNIOR NEVER TIRED OF THE GUY-WIRE.

Junior's Acrobatics

There is no particular point to the pictures of our baby Gibbon on this page, except that they illustrate the dexterity the youngster attained during his first summer on Gibbon Island.

His father and mother are easily able to walk upright on the steeply-sloping guy-wire that runs from the ground to a point about thirty feet up the side of the tree. The baby has the power to walk upright on the ground, but balancing himself upright on the wire is another matter. He goes hand-over-hand, or sometimes hand-over-foot.

Curator Eddy In Albany

"Dead Bees Produce No Honey" is the arresting title of an address given by Curator Brayton Eddy before the State Conservation Council at Albany near the end of the year. He discussed the effects of indiscriminate spraying of DDT.

In mid-February Mr. Eddy will address the Northeastern Forest Insect Pest and Plant Disease Control Committee at Boston on "How to Display Insects."

The Mystery Is Solved

When things are going well in the Aquarium, the sure sign of it is the fact that nothing is happening. The small standing tanks, for example, are supposedly "balanced" with an adjustment between the fishes and their water, so that the tank attendants have nothing to do but to feed and clean.

Just before Christmas, one of our larger standing tanks in the Aquarium developed trouble. The underwater planting had been in place for years without acting up — but all of a sudden it began to lose leaves; they were obviously cut off, and were found floating on the surface in the mornings. New plants were added and were regularly cut up.

An exhaustive and critical survey of every fish in the tank was undertaken. None showed signs of developing plant destructiveness — and fishes are not sufficiently guileful as to damage plants only at night. So, reluctantly, it was decided to

take the tank apart to see what was causing the trouble.

The water was taken out, the fishes netted, the rocks and sand removed. And under the last piece of rock the workmen found a cave, and in the cave a quietly-resting 3-inch Crayfish! The culprit was identified.

How the Crayfish became established in the tank is a mystery, except for the guess that it was introduced last summer, when very small, when Daphnia was put in the water for food. The Crayfish was lucky enough to escape the jaws of the fishes and it found a secure home under the rocks.

Being nocturnal, it would not come out until the lights were off, and thus escaped detection. Then, when it was two or three inches long, it was large enough to do real damage to the plants.

We removed the plant-clipper to another tank without decorative plants and it seems to be making out well. — C. W. COATES.



When these four young Polar Bears came to the Zoological Park last fall from Denmark, they were strangers to each other — and suspicious. For days they sat in opposite corners of their compartment, glaring at each other. But now they are acquainted, and good friends.



Typical of the services of the Society's Education Department is this display at the Samuel Gompers Industrial School, centering around the Electric Eel. In non-technical language the workings of the eel was explained on labels accompanying an anatomical drawing of the fish. Hundreds of students learned something about the nature and problems of research.

Motion Picture Contest

The third motion picture contest of the American Humane Association has been announced, with \$300 in prizes. The contest is for amateurs, and details may be obtained from the Association, 135 Washington Avenue, Albany 6, N. Y.

William Bridges, Curator of Publications of the Zoological Park, is one of the judges.

PUBLICATIONS OF INTEREST

ZOO LIFE. Bulletin of the Zoological Society of London. Dr. Edward Hindle, F.R.S., Editor. Issued quarterly at the Offices of the Society. Subscription, 11 shillings.

Belatedly, for the Autumn number (Vol. 1, No. 3) has already come to our desk, we welcome *Zoo Life*, the quarterly bulletin of the Zoological Society of London. Some years ago the society sponsored *Animal and Zoo Magazine* which, while undeniably popular in treatment, was an

imperfect medium for reflecting the spirit and the tradition of the Zoological Society of London.

Zoo Life, under Dr. Hindle's editorship, is more conservative but it seems to have lost little in popularity; the demand for it is said to be far larger than the printers, harassed by paper shortages, can meet.

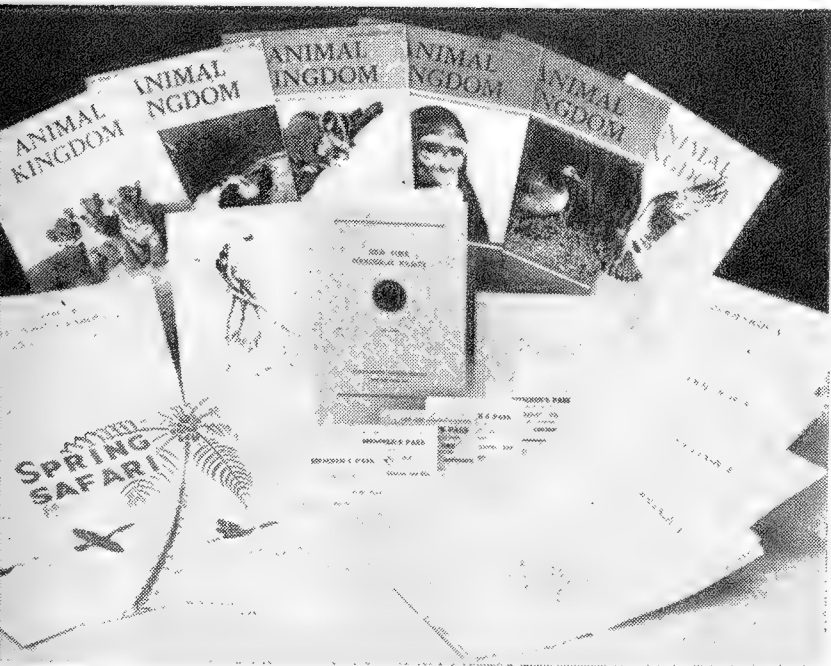
Zoo Life is a magazine of 32 pages, slightly smaller than our own *ANIMAL KINGDOM* in page dimensions, and is plentifully illustrated by photographs taken in the London Zoo. It is designed to inform the reader about animals in the collection of the Society and the Autumn issue contains articles about the Giant Panda, Turkeys, the Komodo Monitor, recent and forthcoming additions to the London Zoo, the Pig-tailed Monkey, and the Lion House in the Zoo. Such authentic and interesting background as they provide should increase the pleasure of Londoners in their great Zoological Garden.—W.B.

Again — We Need More Members!

Your Society gained more members in 1946 than ever before in its history. Our great new programs in Conservation, Research and Education—the fascinating new plans for the Aquarium and the Park—appeal to so many forward-looking people!

However, we still need the active interest of many, many more new friends.

Please send us the names of persons who should be members. The birthday gift of a membership in the Society is an unusually interesting and valuable present.



MEMBERS RECEIVE ALL THESE

Send in gift memberships now so that your friends may enjoy the full program of special events at the Park in 1947. Just mail in names, addresses and dues to the Membership Office. An appropriate notice will be mailed to them at once.

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New York Zoological Society
630 Fifth Avenue
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JOURNAL OF ZOOLOGY

Kingdom



THE MAGAZINE OF
THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

BULLETIN OF THE NEW YORK ZOOLOGICAL SOCIETY

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GETTING AND GIVING

AT THIS VERY MOMENT THEY are coming in from almost every point of the compass — Lesser Pandas from India, tropical birds from Guatemala, strange and wonderful animals from the island continent “down under” across the far reaches of the Pacific—Wombats, Kookaburras, Tasmanian Devils, Wedge-tailed Eagles and—prize of all prizes!—three Duck-billed Platypuses. Safely arrived within the year are Elephants from the Belgian Congo, four young Polar Bears from the sub-Arctic wastes above Denmark, five Elk from the forest slopes of the Yellowstone, and a young bull Moose from the mountain-clad lake country of upper Maine, rare reptiles from Africa and fishes from the Amazon basin. These are bright days at the Zoological Park, fresh with expectancies after the long years when the throttling paralysis of war prevented any such activities and new arrivals in our animal collections were, so to speak, an accident of war — such as the Snow Leopard a soldier brought from Tibet or the Harpy Eagle that a Navy flier brought from Pernambuco.

There is another side to the picture. While these rare or wonderful animals are coming from faraway places, the Society is extending its activities in the field of wildlife preservation. We feel deeply that this is a strong balancing obligation; that if the Society is privileged to add such prizes to its collections, our institution must at the same time do everything within its power to preserve their sanctuaries in faraway continents. It is the simple matter of not getting without giving. The threat to animal life is unfortunately everywhere increasing. In a later issue we hope to be able to report plans the Society and others are now making for a world-wide conference on wildlife protection to be held next year.

Fairfield Osborn

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APR 8 1947



Our new bull Moose meets Maude, one of the two cow Moose that share his corral. Wary — but friendly, describes their attitude. In the background at the left is little Laurel, a tame White-tailed Deer doe, who was full of curiosity about the newcomer from the beginning.

Introduction to the Zoo

By LEE S. CRANDALL

The Bull Moose was bewildered but the wild Elk from Jackson Hole were self-reliant animals — after the first few minutes.

THE INTRODUCTION of new animals to life in the Zoological Park ought, by this time, to be completely routine to us. Certainly we have had Moose in the past, and Elk, and the arrival in the past month, within a few days of each other, of a bull Moose, a bull Elk and four cow Elk ought to have been taken in stride.

But, if one learns nothing else over the years, one does learn that animals are unpredictable and there is no such thing as routine. Take the case of Jerry, our new bull Moose.

Jerry was orphaned a few hours or a few days after birth in the summer of 1945 by a speeding truck that killed his mother. Hand-reared in the Swan Island Refuge near Bristol, Maine, he grew up with no acquaintance with others of his kind.

What, then, would be his reaction when he came to live in our Zoological Park in a two and a half acres of woodland that had, since 1942, been the home of two cow Moose?

We found out. Jerry came to us by truck, in a commodious crate that he liked very much — so much, in fact, that he did not want to leave it and cried in a tiny calflike bawl when we tried to coax him out. Finally we had to pull the crate out from under him and whisk it away before he could get back inside.

Jerry was liberated in a small, wire-fenced feeding corral while the two cow Moose were wandering about on their lawful occasions in a distant corner of the wood. All was well, Jerry was contentedly munching cut vegetables, when, suddenly, an apparition appeared. We knew it was just Old Maude, the tamest and gentlest of



Jerry is playful — but a news photographer got the scare of his life and ran away fast.

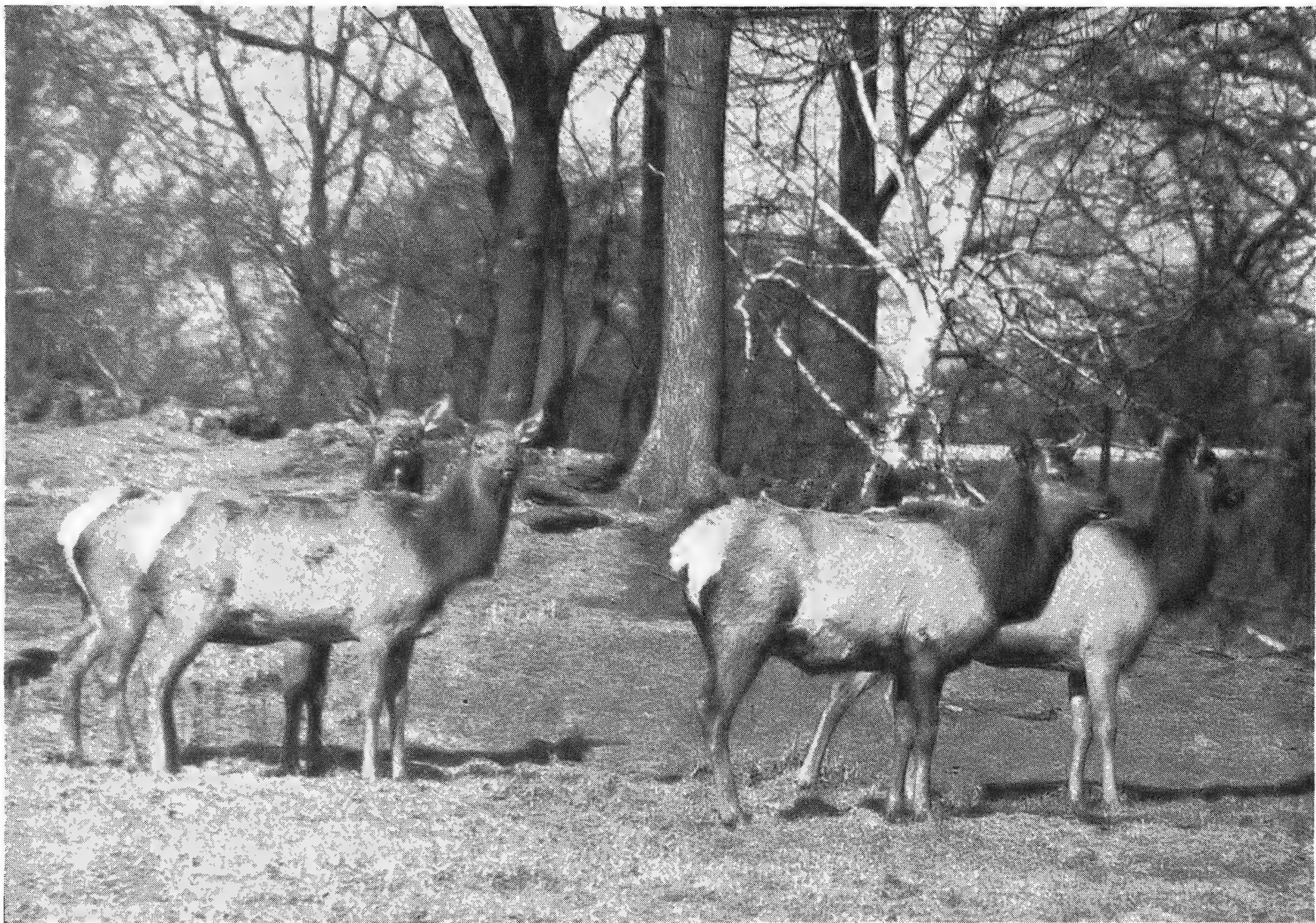
our cow Moose. Jerry obviously didn't know *what* it could be.

One look and he bolted for the back of his corral, banged into the barrier, and began a frenzied running up and down. At each turning he threw a startled look over his shoulder at the apparition, but each look grew a little longer than the last . . . undeniably there was something attractive about this great, shaggy what-is-it outside the fence!

Maude finally wandered away, Jerry calmed down — and that night when Head Keeper of Mammals Gus Schilling made the rounds with his flashlight, he found Jerry curled up on one side of the feed corral fence, and Maude cozily bunked up against him on the other side.

Since then we have not worried about Jerry's introduction to the Zoo.

To complete Jerry's background, we should say that he is a lusty, healthy two-year-old, five feet eight at the shoulder, that he weighs 615 pounds, and bears, with some diffidence, an infinitesimal pair of antlers. For this magnificent



Elk are really adaptable creatures, for our newcomers quickly settled down and except for a natural shyness were as quiet and steady as old-timers. Now, with seven Elk in the herd, we can make an impressive showing on the range on the western side of the Park.

addition to our collection we owe thanks to Commissioner George J. Stobie of the Department of Inland Fisheries and Game of Maine. Commissioner Stobie is extremely fond of Jerry, but he realized that the Swan Island Refuge facilities are not geared for handling a 615-pound-and-still-growing Moose. He told Dr. L. M. Waugh, president of the Campfire Club, of his predicament; the word was passed to us — and now Jerry can be seen any day in the Moose corral on the east side of Baird Court.

Head Keeper Schilling and Harry Overbaugh, the latter an expert animal handler from Roland Lindemann's Catskill Game Farm, crated Jerry in Richmond, Maine, and transported him to us by truck — antlers and all. It was a feat that is not as easy and quick as it sounds in the telling!

QUITE DIFFERENT was the introduction of our new wild Elk from Jackson Hole, Wyoming. They, at least, knew other Elk when they

saw them — and, in fact, that was our salvation at a trying moment.

The Elk, crated separately, arrived on a Sunday morning. It was our plan to liberate the newcomers, one by one, in a comparatively small fenced feeding corral which would serve as a kind of quarantine-acclimatization station for a few days; in the meantime, our two Bronx-bred cow Elk would continue to range over the large corral outside.

One of the new cows was liberated first. Up to the point of actual liberation she had been encouragingly quiet, but she made up for it after the first few seconds. We should have realized that wire fences mean nothing at all to a wild Elk. We *did* realize it when the new cow turned and ran smack into the fence. She fell down, backed off, and smacked it again. It was a blind urge to run and there was no way we could stop

(Continued on Page 60)

A Visit to Brother Joseph

By WILLIAM BRIDGES

WHEN DR. W. REID BLAIR came home from Antwerp in the late summer of 1937 with our Okapi, he brought a story that to me was as romantic as the Okapi itself.

"The animal comes, of course, from the Belgian Congo," he said. "It was caught by natives and taken to a Catholic mission at a place called Buta. One of the missionaries, a Brother Joseph, reared it; they say in Antwerp he has had many Okapis, and knows all about them."

In preparation for the arrival of our Okapi and the article I expected to write in the Society's magazine, I had re-read Herbert Lang's superb story of his attempt to get an Okapi for us more than twenty years before¹. Lang had a gift for picturesque writing and one paragraph in particular had set me dreaming. It was about the home of the Okapi, in the Ituri and Uele districts of the Belgian Congo:

"In spite of tropical luxuriousness it is one of the most dismal spots on the face of the globe, for the torrid sun burns above miles of leafy expanse, and the unflagging heat of about one hundred degrees day and night, renders the moist atmosphere unbearable. Over the whole area storms of tropical violence thunder and rage almost daily. Here natives have become cannibals, and the graves of thousands of white men are merely a remembrance of where youthful energy and adventures came to a sudden end."

Cannibals! Tropical storms! The torrid sun and the graves of thousands of white men! It was a grim, wild and yet romantic setting, exactly the right background for a rare and famous animal. In the excitement of those days while we were waiting for the Okapi to arrive (for, inured



Brother Joseph Hutsebaut of the Buta mission knows more about Okapis than any man living, for he has had 15 of them, including the animal in the New York Zoological Park.

to rarities as we are, there was something very special about the first Okapi in the New World), I formed a clear mental picture of Buta, the Catholic mission, Okapis being brought in by natives and cared for by Brother Joseph.

That imaginary picture is as vivid today as it

¹ In Quest of the Rare Okapi. By Herbert Lang. BULLETIN OF THE NEW YORK ZOOLOGICAL SOCIETY, Vol. XXI, No. 3, May, 1918.



On the road to Buta the Bomakandi River has to be crossed by means of a ferry—an operation that is hazardous only when the automobile slips off the planks at the water's edge.



The famed village of Chief Ekibondo (and his 62 wives) lies along the Buta road. One of the wives is being painted in anticipation of a two-day dance starting that evening.

was ten years ago: a great circular clearing in the green-black jungle, a scattering of white round huts bleak against the jungle undergrowth, lightning and thunder raging just above the treetops and naked savages dancing and yelling on the hard-packed earth.

In the dark doorway of the largest hut, but dimly, I could make out a white-robed figure — Brother Joseph. Always his arm was thrown protectively around the form of a frightened baby Okapi.

Somehow I never completely visualized Brother Joseph's face and personality — I just imagined him as a sort of combination of Saint Francis and Frank Buck.

A few months ago when President Osborn asked me to go to the Belgian Congo and supervise the shipping of three gift-elephants, he suggested I might find other material for *ANIMAL KINGDOM*.



Hunters in the Uele carry nets and spears and almost always are accompanied by a small, silent dog which fanciers call "Basenji."

"Brother Joseph!" was my first and instant response. "I'll go to Buta and see Brother Joseph."

I am not sure that President Osborn knew who Brother Joseph was, and I gave him no time for questions. But he did manage to say "By all means see Brother Joseph." And to that cordial assent I owe one of the most satisfying experiences of my life.

IT BEGAN RAINING late in the morning and the wheel tracks in the road were red rivers that changed to fountains and sprayed ditch, bank and encroaching forest as we charged toward Buta at fifty miles an hour. The brick-brown lateritic mud splashed goats, dogs, hunters and naked children — seldom the womenfolk, for those burden-bearers leaped for the ditch and clawed up the bank to safety when we were still a quarter of a mile away. Through the muddy windshield I saw an ancient, shriveled widow miss her foot-



A novel use for a termite mound — white-washed and set up alongside the road, it serves as a ditch marker through parts of the Uele.



The Premonstrant Order's mission at Buta is old by Belgian Congo standards; it was founded in 1910. Its buildings are large and solidly constructed of light reddish brick. At the right, beyond the lawn, are an enormous handicraft school and the mission church.

ing and tumble into the ditch; a cascade from our wheels fell on the pitiful heap as we passed and obliterated her ritualistic streaks of white clay. It was senseless, dangerous driving, but there was no controlling our demon driver. *Pettè-pettè* meant a crawling twenty miles an hour, *nokí-nokí* was authorization to speed at fifty and up.

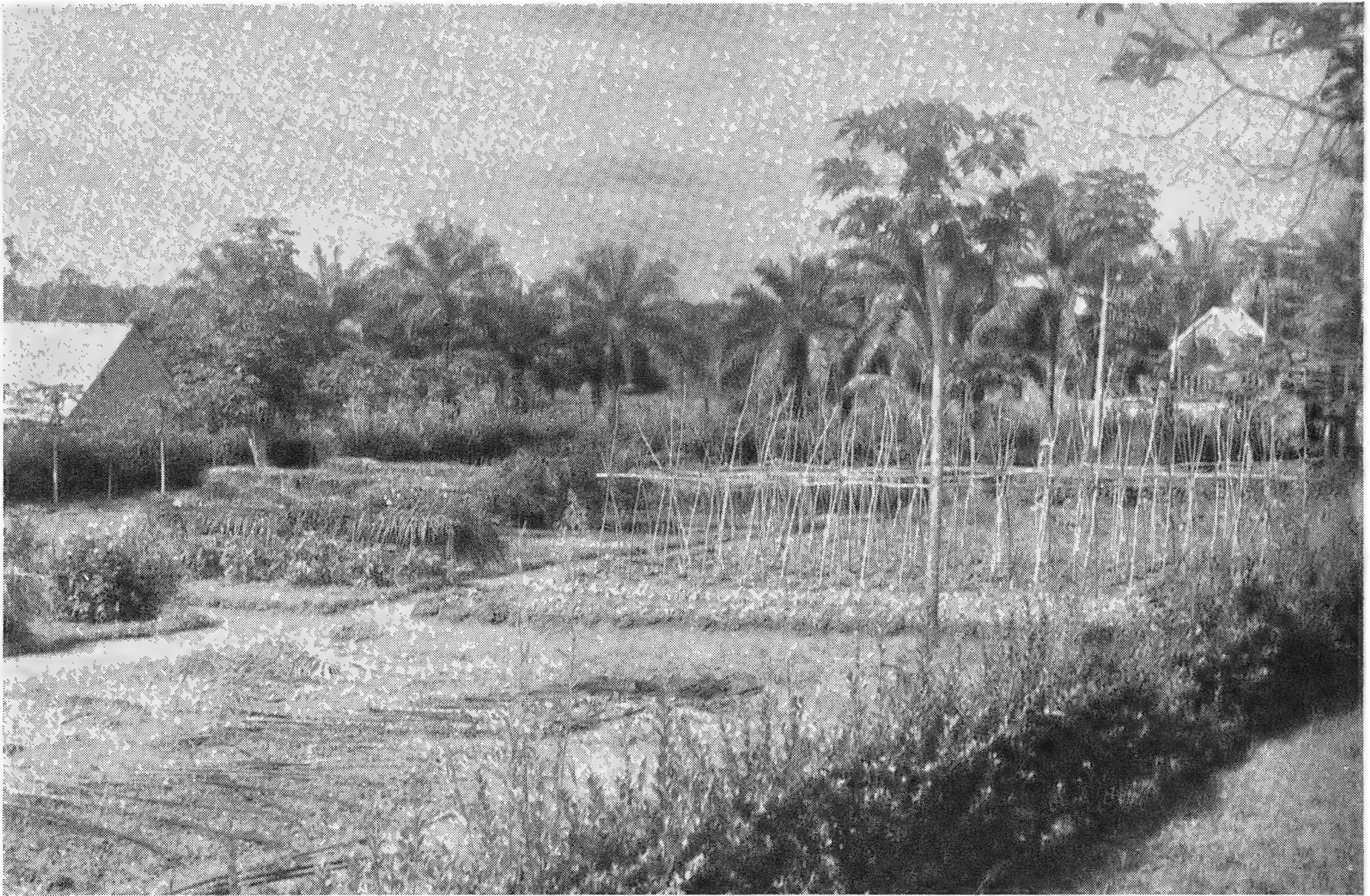
With Lt. Col. Pierre Offermann, Game Warden for the Belgian Congo, I had set out almost a week before from sun-baked Aba on the Congo-Sudan border, our destination Buta some six hundred miles westward. Behind us were the lonely but pretty administrative posts of Faradje, Dungu and Niangara, the savannahs where trampled guinea grass marked the passing of wild elephants, the thin spurs of the gallery forests that rose palisade-like from the grasslands, and now we were in the true equatorial rain forest. This was Lang's country: "one of the most dismal spots on the face of the globe." But where were the cannibals, the graves of the white men?

The violent tropical storms that he had men-

tioned were just the same; at that very moment we were having one — the hardest rainstorm I had seen in six weeks in the Congo. All other *a priori* impressions were being revised rapidly, for this was lovely and exciting country laced with good roads — and no American, speeding across Africa in an almost new Mercury automobile with a visor-capped chauffeur, can escape the self-confidence induced by the smell of gasoline and fresh leather upholstery. Emphatically something had happened to the Belgian Congo since the Lang-Chapin Expedition of 1909-1915.

For one thing, there were few roads and no automobiles in those days; Lang and Chapin (Dr. James P. Chapin of the American Museum of Natural History) had walked a thousand miles in quest of the Okapi and additional thousands in the course of their extended studies on the mammals and birds of the Congo. It was rugged then. But that was more than thirty years ago. . . .

Even so, I was not fully prepared for Buta when we and the end of the storm arrived to-



Brother Joseph's gardens — for he is gardener for the entire mission — are neat and well-kept and even luxuriant. This is one of the several gardens lying behind the main buildings of the mission; it was well-tended despite Brother Joseph's protracted absence.

gether, just at noon. Faradje, Dungu, Niangara, Titule had prepared me for palm-lined streets of hard-packed laterite, for low, open, creamy-plastered residences dripping with the orange tubes of the Golden Rain vine and half-hidden by bougainvillea, frangipani and hibiscus.

But suddenly we rounded a turn and rushed past a collection of long, balconied buildings dwarfed by a seemingly gigantic church tower, scores of adequately dressed boys and girls (not the naked children of the country roads) scurried across the road ahead of us, and another turning carried us through a flowered arch to the steps of a white and shining hotel. Neat guest houses half encircled it beyond — of all things! — a tennis court. Across the road the Banque du Congo Belge was just closing its doors for the noon break and white men in linen shorts were hurrying down the stone steps and scattering to the rambling houses in the gardens along every palm-lined avenue.

Where was the jungle, the fringe of white

huts, the yelling savages and the tame Okapis?

Illusions die hard — mine do, anyway. One by one I had given up the cannibals, the haggard and dying white men, the graves and even the miasmal forest — for where the roads had penetrated, the virgin timber had been cut back and villages and manioc gardens lined the well-tended routes. The torrid sun had failed me; although we were only 3 degrees above the Equator, the sun was busy creating summer in New York. The nights, at least, were uncomfortably cool in this part of the Congo. The rainy season was only beginning and our morning storm had only rained — it had not thundered and raged. I did so want Buta to be grim and desperate. But it was hopelessly, incurably beautiful.

Once at Buta, I was on my own. Colonel Offermann was officially on an inspection trip and had to hasten south to Stanleyville on the banks of the Congo, thence by air to Leopoldville. He had time only to drive to the mission at the edge of the village to introduce me to Monseigneur

Vanuytven. In the steaming sunshine of early afternoon — grateful warmth after the cold rain — we found half a dozen white-robed and bearded Premonstrant Fathers chatting and smoking around a table on one of the porches of the main mission building. They were amiable and informative, glad to see Colonel Offermann again, obviously accustomed to strangers driving up and asking to see not the mission workshops of which they were so proud, but their humble lay brother, Brother Joseph, the Okapi man.

Monseigneur, they told us, was in Europe. Brother Joseph was in the hospital on the other side of Buta — nothing serious, expected to be out in a week or so and back again to tend his gardens and minister to his little collections of monkeys and birds. No, there had been no Okapis around for quite a while; Brother Joseph had been in poor health for a long time and Monseigneur had thought he had better not undertake his scheme of founding a breeding colony of Okapis. He worked too hard — wore himself out.

There was no reason why I should not call on Brother Joseph that afternoon, and so we departed leaving presents of American cigarettes behind — Colonel Offermann to arrange for a Government truck that would carry him to Stanleyville, I to meet Brother Joseph face to face at last.

It was a clear, bright, green and blue and gold afternoon and Buta sparkled after the morning storm. Vague in my knowledge only that the hospital was somewhere behind the Vicicongo Hotel, I took a wrong turning and saw most of Buta (white population, 361) in a rather confused half hour, for the only pedestrians I encountered were black women carrying leaf-wrapped bundles to the Greek trading stores on the outskirts, and they spoke no French, while my Bangala would serve only to slow down the chauffeur and tell him to pick me up the next morning at seven o'clock. But at last, on the west side of one flowery street, I distinguished a long, low, red-brick building set among formal flower beds and served by a curving driveway. The other houses on the street were smaller and more casual; this must be the hospital.

A wide porch encircled the whole building and I made the circuit twice before I found anyone

awake. Then an old man hobbled out and pointed with his cane. Brother Joseph was in the third room from the end.

I found him sitting at a table, folding the pages of a month-old copy of the *Courrier d'Afrique*. "Why, he's a farmer!" I thought. "That is right; that is the way Brother Joseph should look."

He was wearing the rumpled top of a pyjama suit and a pair of khaki trousers. A stubbly gray beard softened the lines of his face and masked his deep tan. His eyes, I think, were blue, but I can never remember the color of eyes. I do remember that his hand was hard and firm, his handclasp forthright and strong.

"I bring a letter of introduction from your friend, James Chapin," I said, being sure to pronounce "Chapin" in the French manner as I had been warned to do.

It was an opening that established me at once; although Dr. Chapin and Brother Joseph met only briefly at the Congo Museum in Belgium many years ago, they have corresponded steadily on a subject that interests them both, the birds of the Belgian Congo, and as I held out the letter with its address to *Frère Joseph Hutsebaut*, Brother Joseph exclaimed, "Yes, I know that writing well!"

I told him my name, that I had come to the Congo as the representative of the New York Zoological Society which had the honor of exhibiting one of his Okapis, and that I had travelled eighteen hundred miles through the Congo to see him. I think it pleased him; he smiled and took my hand once more, then introduced his hospital companion, an emaciated young-old man with a straggling, tobacco-stained beard, who lay on a bed beside the window. We exchanged a few sentences while Brother Joseph read Dr. Chapin's letter, a thick forefinger following the lines as he read.

"*Bien*," he said. "And your Okapi in America — how goes it?"

Brother Joseph, I find in my notes recording the afternoon's visit, is a willing and a constant talker, but a difficult one. For his native tongue is Flemish, and after all his sixty years, French is still a foreign language to him. He has a trick of interlarding his sentences with two phrases — *les choses* and *un moment donné*. They come out



at the most unexpected crises in a sentence and I could never discover their antecedents. Consequently I had to listen very carefully, ask him to repeat, go over certain points twice and thrice.

Brother Joseph told me (and I shall not attempt to repeat his conversational style) that he was born in 1886 at St. Nicholas, Waes, in the province of Eastern Flanders in Belgium. His father was a butcher and indulgent with young Joseph's liking for animals; there were always parrots and canaries around the house.

"It was like taking a first drink," Brother Joseph smiled. "You go on and on, and you want more and more."

A wonderland of animals opened to him when he came out to the Belgian Congo in 1911. The Norbertin, or Premonstrant, Order had founded the mission only the year before and the Uele district was just as grim and forbidding as Lang had described it. In those days Buta was,

From Buta came our Okapi in 1937 — the first and only specimen of this strange and beautiful animal to reach the New World. Brother Joseph was delighted to hear it was thriving.

in truth, very much as I had imagined it — no real white settlement; just a scattering of native huts and villages of soldiers who had served under the Congo Free State. The natives scarcely knew what money was; they had been used to a barter economy in which cloth, salt, cooking utensils and mirrors would buy anything.

Brother Joseph recalled the collecting difficulties of those days. Travel was hard and foot-wearying. He used to make journeys to Aketi, some 20 miles to the west; it took him three to four days. Now, of course, it is half an hour's run.

His job as a lay brother at the mission was to supervise the kitchen gardens but there was plenty of time to wander in the fields. His boyhood experiences in Belgium came back to him;

he began to study the birds of the Congo when he found that many of them were familiar migrants he had known at home. At first it was a mere hobby because he liked to wander afield and to tune his ear to bird songs, but "like taking the first drink," his interest specialized and he began actually to collect bird skins.

Then in 1920 the mission sent him back to Belgium for a short time and he took his collection of skins along, intending to identify unfamiliar ones at the Congo Museum in Tervueren. The famed Dr. Schouteden saw his collection, and was entranced; here were many birds, indisputably collected in and around Buta, that were not hitherto recorded from that area. Brother Joseph went back to the Congo more resolved than ever to study his birds. Since that day he has identified more than seventy-five European migrants that seasonally visit the Congo, and his identifications are regularly reported in the publications of the Congo Museum.

What the ornithologists back home fail to realize, he said, is that the whole Buta region has been changing as the forests are cut down and the native population increases in the mission area. Thus birds that love open country are coming in. And Brother Joseph spies them out and reports them.

From under the table he dragged a little notebook, limp and bedraggled from countless handlings in the field, and he opened it to show me page after page of careful, stilted yet accurate drawings in colored crayon of the birds of the Buta region.

The picture of Brother Joseph that I have drawn is one, I fear, of a quiet and retiring man to whom nothing exciting ever happens—nothing more than the discovery of a bird new to the region, at any rate.

Yet life in Buta does have its moments. A few years ago "Pat" Putnam (himself a capturer of Okapis, in the Epulu Forest) called on Brother Joseph in company with his father, Dr. C. R. L. Putnam. They spent a pleasant afternoon at the mission, talking of birds and Okapis, and Brother Joseph expressed his pleasure in mission life where he had leisure for natural history studies, and nothing ever happened.

As the Putnams were walking through the

mission grounds, they came upon a Leopard skin drying in the sun. They asked about it.

"Oh, yes — there *was* a Leopard around," Brother Joseph said. "As a matter of fact, it was in my room. I sleep with the window open, and I was awakened by this animal knocking over a pile of books. I managed to get out and shut the door behind me, and then I ran around outside and shot the Leopard through the window. It will make a rather good skin, don't you think?"

I find pages of notes about Brother Joseph's comments on the Okapis he has had in his mission corral — fifteen of them, twelve being adults. His first one was a young female captured in 1927. At his own suggestion (for we were mutually having language difficulties), Brother Joseph wrote out seven pages of notes about Okapis and about himself, in a thin, spidery, crabbed hand. There is, I think, little general information about Okapis that was not hitherto known (partly known because of Brother Joseph's own activity), but I find his accounts of the methods of capture extremely interesting; it is a pit-and-runway method that he devised.

But this article is running too long, and it was intended to be only an account of a visit to Brother Joseph himself; the Okapi notes will have to wait for a later article.

On my second day in Buta, I paid another visit to Brother Joseph at the hospital, but I did not stay long. Talking tired him, and it was an effort for him to don his white robe and walk out into the sunshine to be photographed. He was continually having trouble, he said, from injuries he received in an automobile accident in 1932 when he was returning to the mission after delivering an Okapi to the port of Matadi. He thought the doctors might send him back to Belgium this winter for expert care, but whatever their decision, he was coming back to the Congo.²

"Where one's home is, there one wants to die."

Brother Joseph walked with me to the gravelled driveway under the palms and the spiralling bougainvillea. His final handclasp was stout and firm and he smiled when he asked me to carry a good report of him to the Okapi in the New York Zoological Park.

² A letter just received from Dr. Chapin from Brother Joseph reveals that he has returned to Belgium.



Keep your eyes open this summer and you'll see many scenes as distressing as this — a prime example of wasteful and costly erosion that destroys the land beyond hope of repair.

Doing Any Personal Exploring in 1947?

By DONALD T. CARLISLE

INDICATIONS are that this year more members of the Society will take to the trails, the searoads and the airways of the world than for many seasons past. Many others will not seek new sights, but will return to well-remembered summer homes or camps, happy, after the war years, to revisit places they have long loved. In

either case — whether you seek new or familiar landmarks — you may perhaps render a service to your Society's conservation program.

At our Annual Meeting and in the pages of this magazine you have heard or read of our greatly expanded plans in conservation. The protection of wildlife was a key purpose of the



This is what happens when fire — often carelessly set — sweeps a once-forested hillside. The next step is the almost inevitable one of the beginning of erosion and gullies.

Society's founders, and we may all be proud of the record they made as conservators of our vanishing fauna. Today, in the wake of the war, the state of all our natural resources is highly critical. It is impossible without benefit of a world-wide survey to determine even approximately the amount of destruction that has taken place. We can be sure of this fact only: that the environment on which human welfare depends has been weakened to the point of danger, and that it will require heroic measures to prevent actual disaster. Without proper concern for our grasslands, forests, soil and waterways, not only our animal life but we ourselves are threatened.

May we suggest that wherever you travel this summer you turn yourself into a Conservationist for at least a part of the time?

What do the natives — the farmers, fishermen, woodsmen — know about this situation? What is happening to their land, their trees, the water and the animals? What has disappeared and

when, and can the cause be found? Are fields less productive? Are forests or groves going? What climatic changes have occurred?

The "Why?" of all these questions needs to be known before any accurate plan for the emergency can be drawn. By your enquiries and your own observations we may gain real benefit. The research task is colossal, and everyone can help complete it.

It would be especially helpful, if you have a camera with you, if you would take photographs of "horrible examples" of the misuse of our natural resources — of eroded hillsides, polluted streams, fire-ruined forests and the like. Keep accurate records of time and place where the pictures were taken — and send them to us. We feel sure you will take greater pleasure in your membership when you have thus shared in your Society's work. As Dr. Beebe says, "To be a Scientist it is necessary only to observe and report Truth."

The Rare and the Beautiful Aburria

By WILLIAM BEEBE

AS THE RESULT of an outburst of enthusiasm on my part in the Maracaibo Zoo there is now a perfect specimen of the Black Wattled Guan living in our Ostrich House. It is black, glossed with iridescent green, most of the bill bright turquoise, and a long, pendant, fingerlike wattle dangles from the fore neck. This curious appendage is scarlet and yellow, with only a sparse scattering of feathers. The bird was caught by the Indians in the uplands of the Andes in western Venezuela, and like most of its family in captivity is very tame. There was a pair of these birds in the Venezuelan zoo, the male distinguished by the much larger size of the wattle.

The excellent zoo and museum at Maracaibo are under the direction of the Instituto de Ciencias Naturales de Zulia, and thanks to the enthusiasm of the president, Dr. Adolfo R. Pons, much success has been attained in arousing interest in natural history among the children and grown-ups of this great Venezuelan city. Dr. Pons, noting the ill-concealed gleam of desire in my eyes at the sight of Aburria, was able, within

a month's time, to obtain from the Indians this third bird, and to ship it safely to us. It is a pleasure to thank him for his generous interest in our zoo and to plan some adequate reciprocation.



The use of Aburria's scarlet-and-yellow wattle is still a mystery.

The Wattled Guan lives in the cool, subtropical elevations of the Andes, from Colombia and western Venezuela to Peru. In the evolution of the tree fowl of South America there has been an outburst of strange characters. Some have high, sharp-keeled beaks, others an outgrowth at the base of the bill like a great hard nut, while the typical guans have developed a fleshy, scarlet throat flap. In Aburria, the only member of its genus, there suddenly appears the finger-like wattle, comparable to that of the wholly unrelated umbrella-bird. Of the habits of the Wattled Guan we know only that it builds a nest of sticks in a tree and deposits two white eggs. The use of the wattle is a mystery.

The bird is thriving in our Zoo and we may hope, some day, to have other strange and brilliant creatures from the same part of the world.

Pretoria Zoo Has a Baby White Rhinoceros

By R. BIGALKE

Director,

National Zoological Gardens of South Africa

THE PROSPECT of obtaining a pair of the Square-mouthed or White Rhinoceros (*Ceratotherium simum simum* (Burch.)) for the National Zoological Gardens was first investigated as far back as November of the year 1928. At that time there was a possibility that some Square-mouthed Rhinoceroses would be transferred from Zululand to the Kruger National Park, in which area they had formerly occurred. According to Kirby¹ the Square-mouthed Rhinoceros disappeared from the Matamiri Bush in the southern part of the present Kruger National Park in the year 1896. If the transfer were attempted, the Provincial Secretary of Natal was requested to place a pair of White Rhinoceroses at the disposal of the National Zoological Gardens.

Further attempts to obtain White Rhinoceroses from Zululand were made in the intervening years, especially in collaboration with the Director of the Transvaal Museum. At present there is only a bull in that Museum's collection, and more specimens are required for a group. It was not until recently, however, that success was achieved by the National Zoological Gardens in an entirely unexpected manner.

On July 26, 1946, the Honourable D. E. Mitchell, Administrator of Natal, telephoned me from Durban at 12:30 p.m. and stated that a baby female White Rhinoceros had been obtained in Zululand. He generously offered the animal for the national collection and suggested that a lorry be sent to convey it to Pretoria. This kind offer was promptly accepted, and at 5 p.m.

You'd say it was impossible to have such luck—but here is the story of little Zuluana who was captured when she was one day old, and now lives in the Zoo.

on the same day Keeper K. de Waard and Mr. R. Bruins-Lich left the Zoo by lorry for Zululand to fetch the baby White Rhinoceros. They drove right through the night and reached Captain H. B. Potter at the Hluhluwe Game Reserve at about 7:45 p.m. on July 27. The following morning they proceeded to the Nagana Research Station at Masimba Mountain and reached the animal at about 9 a.m. At about 12:15 p.m. on the same day, i.e. July 28, they departed for Pretoria and again drove right through the night. Pretoria was reached on Monday, July 29, 1946, at about 1:30 p.m. After a trip of about 425 miles from Zululand, "Zuluana," as the baby White Rhinoceros has been called at Captain Potter's request, was safely in the National Zoological Gardens. In fetching the animal the lorry covered a distance of about 860 miles.

The manner in which "Zuluana" was procured is related by Mr. A. Adank, the Senior Game Ranger in Zululand, in a letter dated August 12, 1946. The relevant extracts are as follows:

"The belt of Crown Lands around the Umfolosi Game Reserve is from 5 to 8 miles wide and is known as the 'buffer zone.' Some time

¹ F. V. Kirby. In *Haunts of Wild Game*. Edinburgh (1896).



Photo by Dick Wolff

Fig. 1. "Zuluana" at the age of six days, on July 29, 1946. The head is long and truncate anteriorly, the truncation accentuated by the fact that the anterior horn is a mere knob at this stage. On each side of the head behind the eye there is a prominent bony protuberance, the squamosal protuberance (noticeable also in Fig. 3). The nuchal callosities are visible in this picture, but more prominent in Figs. 7 and 8. On the sides of the body there are well-developed juvenile skin folds between the scapular and the pelvic fold; these are less prominent when the animal has had a good drink of two bottles of milk. The umbilical cord is still visible at this time, July 26, but the dry vestige fell off on July 31. There are two inguinal mammae, each with one teat. No teeth were present on July 29.

Our readers will find the legends under the pictures in this article somewhat technical. In a report of such interest to zoologists, it is important to stress technical features.



Photo by Dick Wolff

Fig. 2. August 7, 1946; age fifteen days. At its base the incipient anterior horn is shaped like a shield with a rounded free surface (to be seen in Fig. 3 also). It is covered with a black, more or less shiny, membrane; it is believed that this membrane will be shed in due course. At this stage there is no trace of the posterior horn, but a short distance behind the anterior horn there are two slight concentric depressions, one on each side of the middle line. Behind these depressions the forehead is flat with the skin tightly stretched over it.



Photo by Dick Wolff

Fig. 3. August 7, 1946; age fifteen days. The ears are long and fringed with soft black hair along the entire free edge of the pinna. The shield-shaped incipient anterior horn is quite noticeable here, as is the bony protuberance behind the eye.

ago a few White Rhinos from the southern buffer zone wandered on to the farms on the south and caused some damage to fences. It was then decided to attempt to drive the Rhinos out of the southern buffer zone through the White Umfolosi River into the Umfolosi Game Reserve.

"Captain Potter, the Game Conservator of the Hluhluwe Game Reserve, placed five reliable game-guards at my disposal. With these, ten of my own game-guards and seventy labourers (native) from our bush-clearing works, our first day's drive on July 23, 1946, proved unsuccessful, as the Rhinos stampeded back as soon as they got near the river.

"On July 24, 1946, the drive was repeated over the same area with the same natives, when we managed to chase a few (White Rhinos)

through the river. While the drive was proceeding on the second day, one of my natives came and reported to me that a (White) Rhino cow, scared by the noise, had left its baby near the hyaena caves under the Sangoyana Hills. I sent him back immediately with instructions to guard it against the hyaenas, of which a pack of eight had been seen in the same vicinity during day-time about a week before.

"I reported the matter to Captain Potter, who anticipated that the mother would return, and if she did not, the question arose where milk was to be obtained, as everybody in that part of Zululand used tinned milk which was unobtainable for most of the time. I begged to be given the opportunity to try and rear it (i.e. the baby White Rhino), and stated that I did not mind giving most of my salary for this purpose every



Photo by Dick Wolff

Fig. 4. August 7, 1946; age fifteen days. The toes are large with wide and thick black hoof-like nails, three on each foot.



Photo by Dick Wolff

Fig. 5. August 7, 1946; age fifteen days. When the baby is about to lie down, it sinks down on the hind limbs by bending the thigh downward toward the shank in such a manner that the posterior angle between the thigh and the shank becomes smaller. As the flexion is greater in the case of one hind limb than in the other, the animal comes to lie on that side with that hind limb underneath the body. The front part of the body comes to rest with the fore limb bent upon itself at the wrist (carpus), i.e. the palm (metacarpus) is apposed to the forearm. The ears are laid back against the body. The animal may also turn completely over on its side with the four limbs projecting completely. In the act of rising, the front part of the body is the first to be raised and the hind part follows.



Photo by Dick Wolff

Fig. 6. August 7, 1946; age fifteen days. A posterior view of the baby White Rhinoceros.

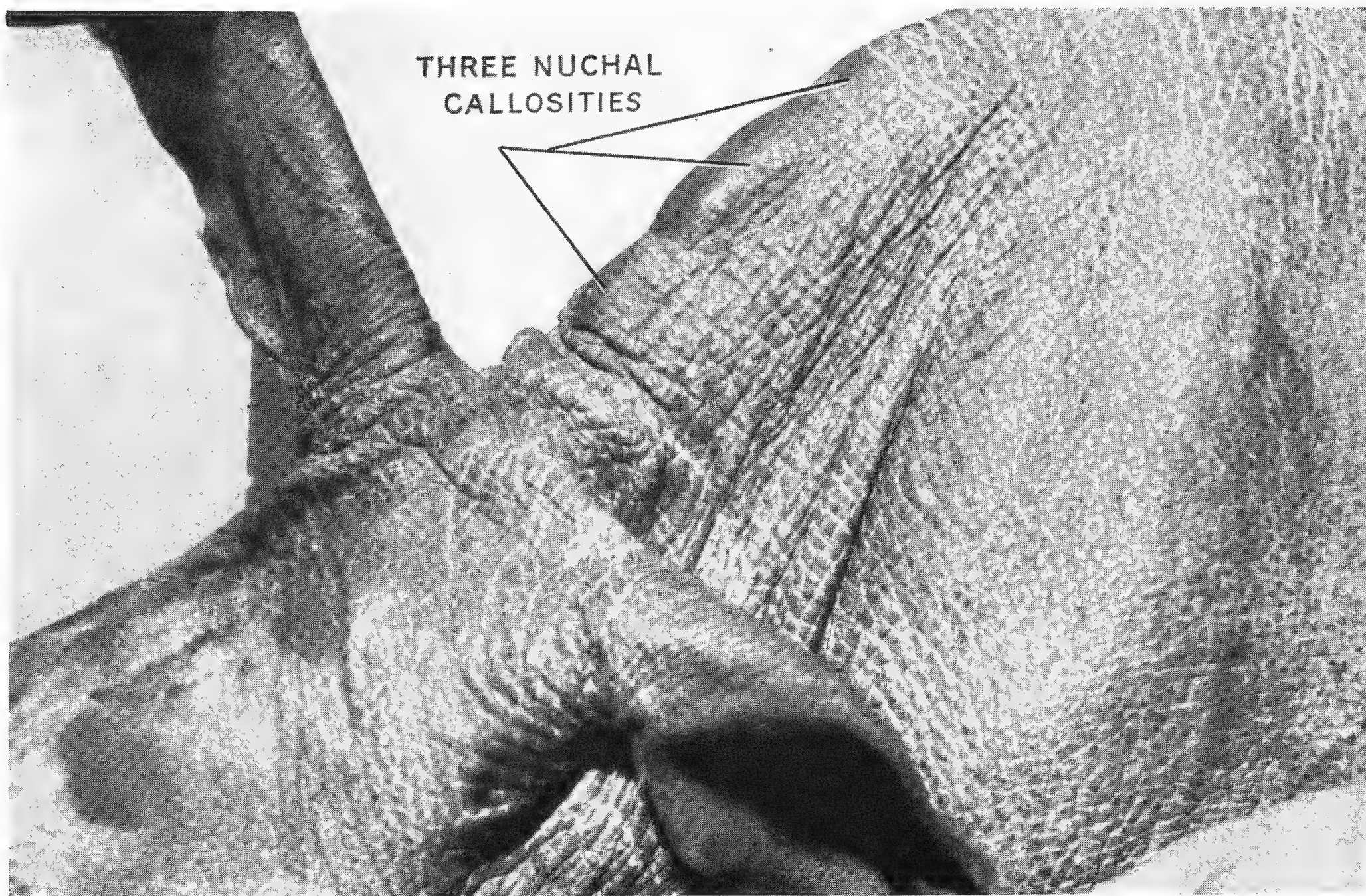


Photo by W. Schack

Fig. 7. Nuchal callosities from the left side

month. Captain Potter granted permission on condition that if I found its mother had come back, I should let it go. I was happy that I was allowed to adopt this child and, asking Mr. T. Scheepers and Mr. K. de Haas to accompany me, I started the journey to Sangoyana with a three-ton lorry on which I had my camping equipment. We got to the Rhino an hour before sunset; it was a relief to find that the mother had not returned.

"I spread my tent to pad the lorry near the cab, then spread my mattress on the tent. We put the Rhino into a bag up to the neck to prevent her fighting to get up, then lifted her gently on to the bed where she fell asleep after the first mile and slept until we got to the camp of Messrs. Scheepers and de Haas, fifteen miles from the Nagana Research Station. From there two natives were placed in charge of the Rhino while I drove on, cruising down the hills and holding thumbs for petrol whenever we went uphill. The petrol lasted to within three miles from the Research Station. I paid a native five shillings to run for petrol, and Mr. Scheepers

from the Research Station brought some. It took five minutes to prepare the room and put 'Zuluana' where Mr. de Waard found her (i.e. at the Nagana Research Station).

"As my car was at a garage for repairs, I got Mr. Scheepers to take me in his private car at one shilling a mile to find milk. We travelled 35 miles with no success and were back at 11 p.m. We gave 'Zuluana' a little 'Klim' which Mr. Goosen could spare. She greedily sipped it out of a dish.

"I obtained permission to use my half-ton official lorry to go and see whether I could raise one of my own cows at Mkuzi with enough milk to rear the Rhino. At 11:30 p.m. I started for Mkuzi.

"It is very dry at Mkuzi, and I did not have a cow with sufficient milk. So I bought one for twenty pounds. At 2 p.m. (July 25, 1946) I had offloaded and milked the cow here (i.e. at the Nagana Research Station) and 'Zuluana,' after only two feeds of 'Klim,' got her first feed of cow's milk. The speedometer showed 190 miles."

In amplification of the above, Mr. D. E.

Figs. 7 and 8. August 21, 1946; age 29 days. On the neck in front of the withers are three epidermal callosities to which Dr. R. Broom called the author's attention. (Also shown slightly in Fig. 1.) They consist of a larger central callosity about $2\frac{1}{4}$ inches long, a short anterior callosity about 1 inch in length, and a still shorter posterior callosity about $\frac{1}{2}$ inch long. Both the anterior and the posterior callosity are separated from the middle callosity by a transverse groove; these grooves are very clear when the animal bends its head upward. The middle callosity is well developed and hard to the touch, and the posterior callosity is least developed. Their length varies with the position of the head. When the mouth is near to the ground (as in Figs. 1 and 7) the callosities are stretched somewhat, and in this position the posterior callosity is just distinguishable. These callosities may be called the nuchal callosities.

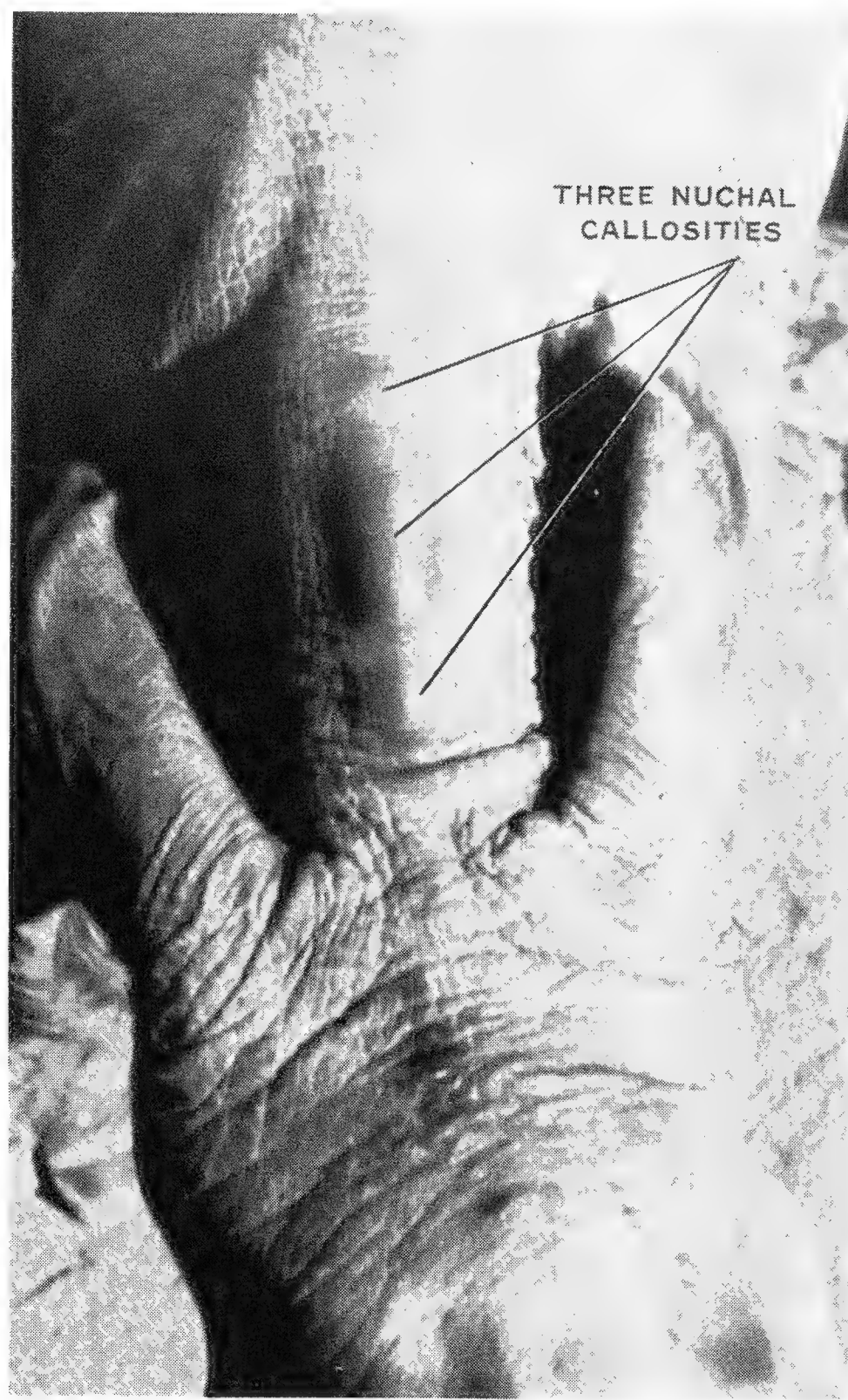


Photo by W. Schack

Fig. 8. Nuchal callosities from the front.

Mitchell informed me verbally that the drive on July 24 took place very early in the morning. Mr. P. J. Goosen of Onderstepoort, who was present at both drives, states that no baby White Rhinoceroses were observed on July 23. The calf "Zuluana" was found early on the morning of July 24, and in the evening the adhering part of the umbilical cord was still soft and wet. Hence the animal had probably been born during the previous night. It will be assumed that the date of birth is July 23, 1946.

It is clear that the acquisition of the baby White Rhinoceros is the result of a sequence of fortunate events. Its significance lies in the fact that no specimen of *C. simum simum* has previously found its way to any zoological garden in the world.

On August 1, at the age of ten days, the animal stood 60 cm. (about $23\frac{1}{2}$ inches) high at

the withers, and a week later, on August 7, it was weighed and found to be $105\frac{1}{4}$ pounds. [A later communication from Dr. Bigalke reported a weight of 161 pounds on November 23.]

It is intended to keep records of the growth of the baby White Rhino and to publish these in due course. A few observations may, however, be included at this stage.

The baby gives vent to a soft, high-pitched whine, and it can generally be induced to do so if the keeper tries to imitate the sound.

In the complete act of defecation soil is scraped over the excrement by means of alternate backward movements of the two hind limbs. Partial defecation sometimes takes place while the animal is being fed from a bottle, and then the scraping has not been observed.

The young animal is making good progress, and there is every hope that it will be reared.



ABOVE — The Nursery in a corner of the Lion House is Mrs. Martini's special domain. Pictures of the babies of yesteryear line the walls, furnishings are spotlessly white.

RIGHT — Josephine the Chimpanzee is one of Mrs. Martini's favorite pensioners, for she is so gentle and so apt at learning "civilized" habits. Eating at a table is a specialty.



Zoo Nursery

Baby animals are a delight in any zoological garden—especially if their own mothers take care of them and rear them. But that is not always the case, and then the zoo staff's troubles begin.

Ours ended the day, now four years ago, when Mrs. Fred Martini, the wife of the Keeper of the Lion House, volunteered to rear a Lion cub abandoned by its natural mother. Mrs. Martini brought such gentleness and patience and understanding to the task that since then she has been made official foster mother for all our waifs and strays, from Tigers to Hedgehogs.

The Zoo Nursery occupies half her time; the rest she devotes to the care of small and delicate birds in the Jewel Room.



ABOVE—Rajpur is a big Tiger now, half again as tall as his foster mother, Mrs. Martini. Of almost equal height when he really stands up and stretches is Raniganj, at the left. The two Tigers and their sister Dacca were each 20 inches long when they were born on February 8, 1944. They were hand-reared by Mrs. Martini in her apartment; Rajpur we now estimate to weigh about 600 pounds.



Being small has one great advantage—Mrs. Martini can actually get into many of the cages in the Jewel Room to clean and water the plants.



Making friends with the occupants of the Jewel Room cages is the first thing Mrs. Martini does — here, with the Eastern Cock-of-the-Rock.



But there's hard work in this job, too; heavy buckets of gravel have to be taken out of the cages, and the gravel washed with hot water.

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Introduction to the Zoo

(Continued from Page 36)

her — except to do what we did; to cut the fence and let her out on the big range.

She streaked just as blindly for the far corner, but this time she saw the wire barrier and drew up before running into it. But she did begin a desperate up-and-down running at full speed that would, we knew, exhaust her and probably eventually kill her.

It was another one of those moments that are decidedly out of the routine!

All this time our two cow Elk were standing close together in the center of the range, unconcerned by the excitement engendered by the new arrivals. They gave us an idea. In a moment, a small boy was dispatched around the periphery of the range, outside the fence, with instructions to run up to the fence near the frantic cow and distract her attention. He did — and it worked. The Elk halted, uncertain of

what danger this human being presented, and looked around. A few hundred feet away she saw two of her own kind.

She streaked toward the center of the field, toward our cow Elk, circled behind them and slid in between them. And then she quieted down instantly.

After that, one after another we liberated the four remaining newcomers, and they too joined the Elk in the center of the field. It was a smooth and easy operation. Just routine!

Our new Elk were crated and shipped by James R. Simon, director of the Jackson Hole Wildlife Park, under a permit kindly issued by Game Commissioner Lester Bagley of Wyoming. Somehow (we haven't puzzled it out yet) Simon got six-foot-six crates through the five-foot-six doors of a freight car. Less ingenious, we had to saw the tops off the crates to unload them. But that really was routine for our Superintendent of Construction and Maintenance!

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

It's Spring Again

The Children's Zoo will reopen on Saturday, April 5, for its seventh year, and a little later in the month, at a date not yet established, Question House will begin its third season.

Tractor train service around the Zoological Park, from Boston Road Gate to the main exhibits and return, started on Thursday, March 27.

Telling the Society's Story

Groups of widely varied interests have asked the Zoological Society to discuss its conservation objectives during the past few weeks. President Osborn has given four such talks and has found that immediate interest and support are forthcoming.

His speaking engagements included the monthly meeting of the Chamber of Commerce of the State of New York, the annual meeting of the New York Genealogical and Biographical Society, the Trustees of Public Reservations in

Boston and the student body of Groton School.

The Zoological Society of Maryland is in process of reactivation, and Executive Secretary John Tee-Van recently spent a few days with the organizers of the Society in Baltimore, advising them on methods of making the Society effective.

"Advances in Genetics"

Dr. Myron Gordon, the Aquarium's Geneticist, is one of eleven leading geneticists who have contributed chapters to "Advances in Genetics," published by the Academic Press of New York, under the editorship of Dr. M. Demerec, director of the department of genetics of the Carnegie Institute of Washington at Cold Spring Harbor. It is intended to publish an annual series of such volumes. Dr. Gordon's contribution was on "Speciation in Fishes," and stems from the important work he has been carrying on for the Zoological Society for a number of years.



Two Cottontail Rabbits have been wintering in a compartment outside the Small Mammal House and the last heavy snowfall gave them a chance to build a snug form in a drift.

Our Films Available to Members

The Education Department is now offering a variety of excellent 16 mm. natural history films on a rental basis. Many of these Society-produced films, both black-and-white and color, silent as well as sound, have been shown in former years at the Annual Meetings at the Waldorf-Astoria. Although most of the films were produced for educational purposes, they have proved so popular in private homes that the Society is now offering them to its Members at a 20% discount from the usual rental rates.

For complete information about these films, including synopses and rental rates, request the "Visual Aids Interim Film Listing" from the Education Department, New York Zoological Society, New York 60, N. Y.

Society Members should identify themselves as Members when placing an order, and it is well to give us as much advance notice as possible, since there are many calls for the films.

Laying the Groundwork

Preliminary steps in organizing a long-range conservation program for the Zoological Society were taken in mid-March when Prof. Aldo Leopold, professor of Game Management at the University of Wisconsin; Conservation Commissioner Steen of Missouri; and William Vogt, chief of the conservation section of the Pan-American Union, held a two-day conference with members of the Society's staff.

John Shea

John Shea, Collector and Foreman of the old New York Aquarium at Battery Park, died on March 7 after forty-eight years of faithful service. He started work in 1898 when but ten years old; his first job was selling guidebooks at the Aquarium's entrance. As Collector he made more than fifty expeditions to Florida, the Bahamas and Cape Hatteras—besides innumerable collecting trips for local marine and inland freshwater species—and brought back to New York all kinds of aquatic animals from porpoises to sea anemones. It is safe to say no man has ever approached Mr. Shea's record of successfully gathering together and transporting hundreds of thousands of fishes for public exhibition.

Zoology Plus Philately

The biggest and best collection of animal postage stamps in the world is that of the late Miss Carla Pelander of New York City, for it contains thousands of stamps (400 album sheets) and includes all but a very few of the world's stamps bearing pictures of animals.

In 1941 we were privileged to exhibit part of the collection; this spring we are exhibiting almost all of it, in a special showing in the Heads and Horns Museum Gallery. The exhibition was arranged through the courtesy of Mr. Carl Pelander, by Mr. Ignatz Reiner, one of our Members.

The stamp show opened on March 15 and will continue through May 3. It is, in a way, a preview in recognition of the great Centenary International Philatelic Exhibition to be held at Grand Central Palace from May 17 to 25.

The earliest known stamps were the fiscal issue of Sardinia, issued in 1818 and depicting a horse and rider. However, the first animal postage stamp bore the picture of a Dove and was issued in Basel on July 1, 1845. This was followed shortly by the St. Louis, Missouri, Postmaster's Provisional of November, 1845, depicting two Bears. Since that time virtually every country has shown animals on its stamps at one time or another.

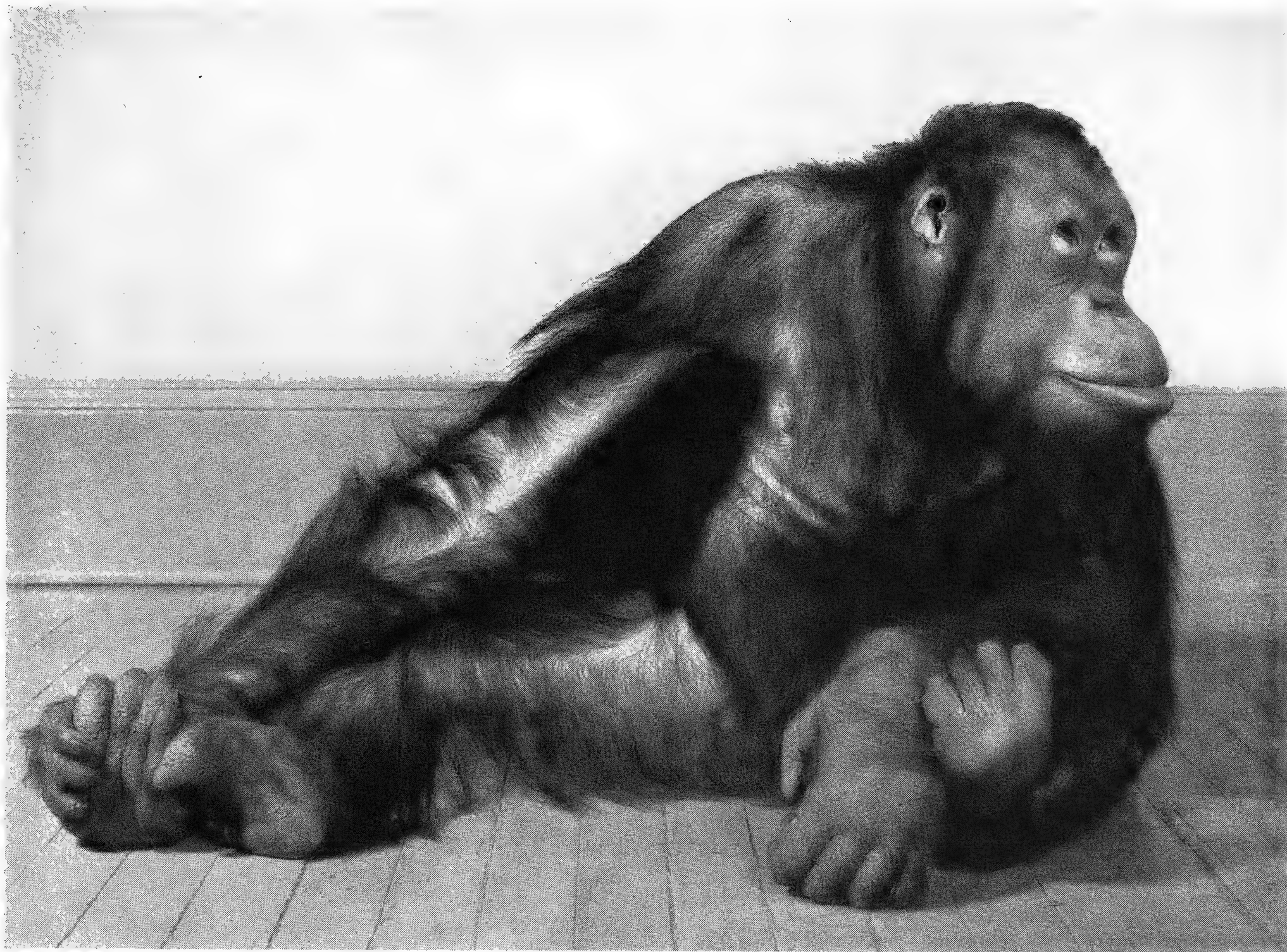
To increase the zoological interest of the Pelander collection, placards in the Gallery list the stamp and identify the animal it depicts, and then tell where, in the Zoological Park, a living specimen may be seen.

A visit to the exhibition is a good way to derive triple benefit—by increasing one's knowledge of philately, geography and zoology.

Tropical Birds Arrive

The most important shipment of tropical birds to arrive at the Zoological Park in several years came at the end of March from Guatemala, having been caught and transported by Charles Cordier, the Society's own collector. Special notices will be sent to the Membership as soon as the collection is ready for inspection.

Mr. Cordier went to Guatemala more than a year ago to collect Ocellated Turkeys for Dr. D. C. Newill of Connellsville, Penn., and re-



A characteristic pose of Mike, the Orang-utan, when he knew a photographer was in the offing and that he would be suitably rewarded with food at the end of the picture-taking. This was the last picture taken of Mike before his untimely death some months ago.

mained to gather rarities for our Bird House. The shipment arrived on the United Fruit Company's *SS Pan Crescent*.

"Zoo People"

The staff of the Zoological Park have long known that the Zoo is the most fascinating place in New York; now *Holiday Magazine* has discovered that "Zoo People" have their points of interest, too. The result is an entertaining article on various members of the curatorial and keeper staff in the current April issue of the magazine.

* * *

Long before the arrival of flight Robins from the south — sometimes a month earlier — the Robins in the Dome Cage on the southeast corner of the Bird House begin their spring song. It is a cheerful and encouraging sound amid the March snows.

Learning City Ways

An incident that occurred when our new Elk from Jackson Hole were liberated in the Zoological Park deserves to be recorded as a kind of footnote to General Curator Crandall's "Introduction to the Zoo" in this issue of *ANIMAL KINGDOM*.

The new Elk were, of course, completely wild and "uncivilized." They were corraled and boxed when they came down to their winter range and were quite accustomed to foraging for themselves. Consequently, when we turned them out on a snowy winter day and they found themselves hungry, they instinctively began pawing away the snow to get at the dry grass underneath.

They found the grass — unpalatable as it must have been. But the interesting thing is that our own Zoo-bred Elk, accustomed to having hay and grain brought to them regularly by their

keeper, never think of pawing the snow and eating dry grass. When they are hungry, they simply stand near the fence and bawl until the keeper breaks open a bale of hay.

It speaks well for the adaptability of the new Elk that they, too, within forty-eight hours, learned the new technique. Now they wait for their food to be brought them.

PUBLICATIONS OF INTEREST

ANIMAL DRAWING AND PAINTING. By W. J. Wilwerding. Watson-Guptill Publications, Inc., New York, 1946. 148 pp. 279 illus. \$6.

To the scores of young artists who come regularly to the New York (or any other) Zoological Park in quest of models, Walter J. Wilwerding's *Animal Drawing and Painting* is to be heartily recommended. The author herein has engagingly taken the amateur draughtsman behind the scenes and has given him the benefit of many time and patience-saving shortcuts to a happy result. The frequent necessity for making many fragmentary sketches and notes in order to have sufficient material for a finished study, the hours of the day most profitable for sketching, the suggestion that beginners start with an animal in repose, are among the many bits of advice that will help the tyro artist to head in the right direction. The work continues in this vein through 116 pages of sound suggestions with copious fine examples from the author's work to point the argument.

Mr. Wilwerding's thesis, set forth so definitely in the first paragraph of his foreword, is that his chief desire is to start his reader off "by directing him to that best of all possible schools — nature." On the whole there can be little quarrel with this objective. If any quibble is to arise over the point it might be for the fact that the author's order of procedure and perhaps his emphasis are to be questioned. He plunks his neophyte into the zoo or the circus with "a sketch book and a few pencils, together with an eraser," and encourages him to strike out for himself. This is in Chapter I and it is not until Chapters V and VI that he discusses "Comparative Construction" and "Anatomical Considerations." Here Mr. Wilwerding in so many words asks: "Why should an artist concern himself too seriously about what lies under the skin of an animal?" and states that

he himself was for many years an almost incurable anatomist — knowing the number, name and position of all the bones. And the same went for muscles, too! It was many years, he says, before he found that *some* artists, without the slightest knowledge of the subject (anatomy), "could beat me painting animals by the simple expedient of painting them in correct color and light and shade, indicating the texture of hair and fur." While he claims thereon to have altered his approach, one wonders, on viewing the beautiful examples of his own work, whether his results would have been so fine had he not learned the insides of his models at the start. To this critic it seems probable that most aspiring animal artists should have something of a grounding in bones and muscles before they attempt character, features and fur — granting the exceptional individuals the author has met.

The book is strictly for the literal. It will not be of much help to the designer who wishes to use an animal motif and it will not aid the man who draws GOP elephants, three-fingered movie mice or Schenley roosters. For him who wishes to play the animals straight it will be useful in all particulars. — DONALD T. CARLISLE.

IN THE FORESTS OF THE NIGHT. By James Riddell. A. S. Barnes & Co., New York, 1946. 229 pp., 97 illus.

On the theory that "night-time would be the time least expected by an animal to find people about with cameras, and in consequence he would be undisturbed and natural," the author and a friend went to Kenya and the Belgian Congo in 1938 to take night photographs of animals.

They never did get the picture of the Congo Gorillas that was the prime goal of the expedition, but they were more fortunate with the Bongo, Elephants, Bush Pig, Hippopotamuses and other night prowlers. Pictorially, however, it is doubtful whether anyone except the author (and presumably his publisher) would consider the expedition a success. Generous allowances have to be made for all night photographs, and these are poorer than most. The daylight photography samples in the book are not unexpectedly superior.

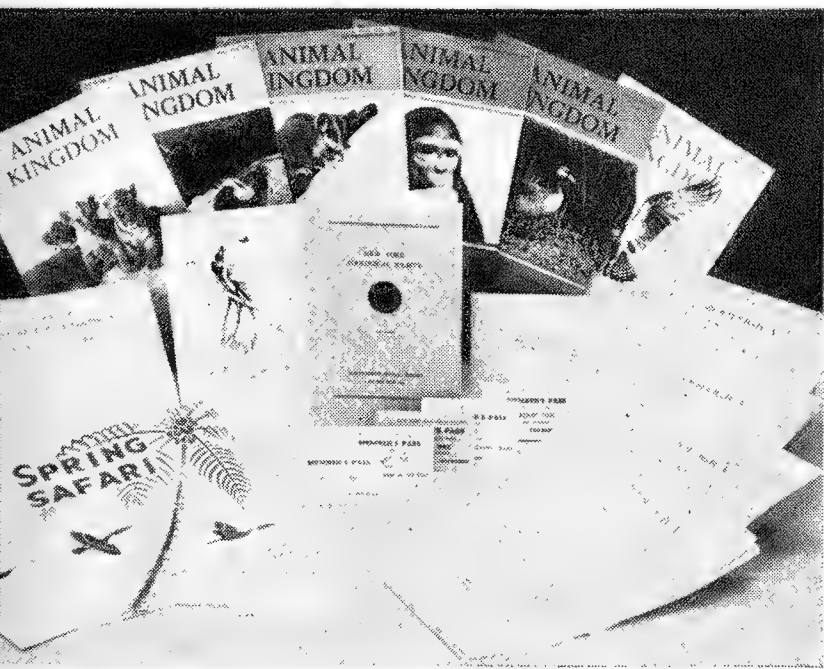
The text is chatty and gossipy and occasionally catty when referring to people the author didn't like. — W. BRIDGES

More Fun for More Members

Your Society is well along in its great postwar program. More rare and beautiful animals from all over the world are coming in. Important progress is being made in conservation, and on many valuable research projects. Plans for the new Aquarium are well advanced. It is more fun to be a member of the Zoological Society than it has ever been before.

Society membership is growing fast—but we still need more members. Please send us the names of everyone you know who should join.

Most of our 1947 program lies ahead



MEMBERS RECEIVE ALL THESE

The birthday gift of a membership in the Society is an unusually interesting and valuable present, and those who join now will be able to enjoy the better part of our fascinating program of special events for 1947. In making gift memberships, just mail in names, addresses and dues to the Membership Office. We mail an appropriate notice to each gift member.

MEMBERSHIP COMMITTEE • NEW YORK ZOOLOGICAL SOCIETY
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ANIMAL KINGDOM



THE MAGAZINE OF
THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

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THE POWER OF THE PLATYPUS

THE DAY HAS FINALLY COME — the first of a generation that American eyes could look upon the “most marvelous of living mammals.” The day was the child of predecessor days to the exact number of 472 — just so many have been expended in preparing to bring them here safely and to keep them well when they arrived. There were no boundaries to our determination that every step should be taken to make the enterprise successful. Sometimes we almost laughed at ourselves for all the trouble that was being taken over three little animals of an aggregate weight of only about 8 pounds. On the day of their arrival, batteries of photographers from newspapers and newsreels made an array such as that which would greet the most distinguished of foreign visitors. Since then the radio, magazines and the press have all “gone platypus.” We were sure that they would take America by storm. So they have.

Of course we are still on the anxious seat for them. Tender and temperamental they are to a degree, and exacting in strange and unexpected ways. But we have to respond and give them what they ask for. So far so good.

Scores of reasons are advanced as to why they magnetize the public — “bill like a duck, lays eggs, suckles its young, furred, poison-spurred, web-footed,” and all the rest of it. Perhaps, just perhaps, there is another reason.

There is something whimsical about the whole matter. Perhaps it is because they could not make up their mind. That’s human enough, so maybe it is one of the bonds between us and them. Millions of years ago they had the choice of climbing the broad path of evolution to the upper levels of the mammalian hierarchy, but no, in indecision they continued as they were. So they still lay an egg, they still suckle their young, and so remain the living link between the misty eons of the past and this very bright summer day in 1947 — the power of indecision in its ultimate expression!

Fairfield Osborn

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JUN 23 1947



The Platypusary, home of Cecil, Betty and Penelope, is in the very center of the Zoo. Visitors (notice the line in the background) can pass through at the rate of about 3,000 an hour.

How the Duck-billed Platypuses Came to New York

By DAVID FLEAY

*Director, Sir Colin Mackenzie Sanctuary
for Native Fauna
Healesville, Victoria, Australia*



WE WERE CAMPED in one of the world's wildest and most rugged areas, southwestern Tasmania to be exact, seeking the near-extinct Thylacine (marsupial "Tiger") when, in February of 1946, Mr. Fairfield Osborn's first cable and letters asked us to come to New York with a Platypus family.

It was a proposal fraught with cares and complications of an exceptional order. I had kept the Platypus, and bred the Platypus, but to root such delicate and temperamental animals up and away from their natural environment, to journey at least 12,000 miles by land and sea and possibly

by air, was a frightening prospect. It would certainly need thorough organization and a personal concentration on the matter each day and night from start to finish. With the unpredictable nature of the Platypus in mind, the whole matter was an uncertain quantity—but, on the other hand, with due care why should it not succeed?

Thanks to the willingness and cooperation of my friend and colleague in fauna conservation and study, Mr. Fred Lewis, Chief Inspector of the Fisheries and Game Department of the Victorian State Government, who appreciated the excellent reputation of the New York Zoological Society and the fact that this was no ordinary matter but rather one of scientific and educational interest, permission was granted and I decided to go ahead.

Beginning in early April of 1946 I spent a full three weeks of largely nocturnal activity along and in the cold mountain streams within a ten-mile radius of our Badger Creek Sanctuary near Healesville, Victoria. The streams concerned were New Chum Creek, Watts River and the Yarra River. It was well into the Australian fall and consequently extremely cold at night, and more than a month late to secure baby Platypuses at the ideal stage—that is, youngsters newly away from the nesting burrows. A one-ton army truck carried gear to accessible places on the streams, from which spots, with the aid of whatever helpers I could find, coils of wire netting, cage traps, nets and stakes were manhandled up or down stream according to previous nocturnal reconnaissance.

The haunts of one or more of the shy little animals had to be known before it was worth while going to the considerable trouble of battling through dense blackberry growths, deep pools, over great fallen trees and low-hanging green ones, not to mention the confused débris of past floods. Those still, cold, starry nights on the rivers with the ripple of water over logs, the long vigils following the erection and pegging down to the river bed of races, palisades and cages at sunset, and the occasional double splash of a startled Platypus, were damp and uncomfortable and yet strangely attractive.

Inspections up and down stream away from the areas of operation, usually covering half a mile at a time, would reveal odd "flat-oval" bur-



David Fleay Photo

row entrances or doorways at the back of tree root labyrinths—unmistakable indications that one was looking at the past or present home site of a Platypus.

Most exciting incidents were the moments when a Duck-bill, swimming underwater downstream from one deep pool to another, would meet the wire netting race, would surface, and either crash dive with the startling noise of its typical head-and-tail double splash to return upstream, or quietly submerge after lying flat and motionless and watchful, with the characteristic telltale sound of rapidly popping air bubbles. Assuming that the Platypus then entered a cage

LEFT—Cecil, the male Platypus, is 2 years old this spring, weighs 4 lbs., and is almost full-grown. He has a dangerous venom spur on each hind leg. Only males bear spurs.

BELOW—Poison spurs inside the ankles of the hind legs. They are about half an inch long, horn-colored, and a minute canal connects with venom glands on the flanks.





David Fleay Photo

Betty is a light silvery-brown Platypus, now about 18 months old, weighing about $2\frac{1}{4}$ pounds. She is 17 inches long and thus is nearly full-grown. Of the three Platypuses, Betty is the fattest and has the most equitable temperament. Almost all bright colors frighten her, however.



David Fleay Photo

Penelope is a very dark animal, most temperamental of the three. The open bill in this picture indicates her nervousness at being handled. Her age and length are the same as Betty's, but she weighs only 2 pounds, perhaps because she always refuses to eat the fattening egg custard.



David Fleay Photo

Platypuses are found both in eastern coastal Australia and on the island of Tasmania. This is the picturesque Franklin River in southwestern Tasmania, typical home of the Platypus. The waters are cold and clear, but never freeze over. The Duck-bill ranges from 3,000 feet to sea level, in fast-running mountain streams, sluggish meandering rivers and fresh-water lakes.



David Fleay Photo

Nest and eggs of Jill, Mr. Fleay's pet Platypus, photographed in situ at Healesville in 1945, two seasons after the hatching of Corrie, the first baby Platypus hatched in captivity. The nesting material is mostly eucalyptus leaves. The two adhesive, dull white eggs are about the size of ordinary hothouse white grapes. They have a thin, leathery shell and hatch in about 12 days.

trap, it was not always possible, even with the aid of a flashlight, to know whether the quarry was actually within the enclosed area. Its bumping about at the bottom, four feet below the surface, and a rapid vibration through the netting were usually the sole indications. Some Platypuses, however, realizing their predicament, would simply "anchor" at the extreme depth possible and remain entirely motionless with closed eyes and ears for five minutes at a time. Then, quietly and unobtrusively, a half-inch of bill would project vertically until the nostrils were just above water, and down without a ripple would go the Platypus again.

In the case of one or two Platypuses that back-pedalled upstream after touching the wire netting and indicated their presence by splash diving nervously, it proved possible to run quickly a hundred yards along the bank above them and

then wade precariously downriver (occasionally with complete but unpremeditated submergence) to drive the animal into a one-way trap. On one such venture, as I stood still in three feet of clear water, using a powerful flashlight, an underwater Platypus nosed leisurely around my rubber boots and between my legs, but he disappeared like a flash when I endeavored to seize his tail!

Some frosty nights of extra coldness yielded no faintest signs of Platypuses. On each occasion, in the early hours of the morning, it was a case of going home for a few hours' sleep and dry clothing before returning to the fog-shrouded river at dawn. Often other denizens of the river besides Platypuses entered the cages—eels, brown trout, large, white-clawed blue crayfish and the water Rat (*Hydromys*) which, like its representative here in the United States, the Musk Rat, found trapped prey irresistible. One morning a



Melbourne Sun Photo

David Fleay, "the Platypus Man," holds Jill in his right hand, and baby Corrie in his left; the occasion was Corrie's second birthday anniversary at Healesville in 1945.

Platypus, a Water Rat and two much-mangled eels were associates in a common predicament in one trap.

Freshly caught Platypuses were transferred immediately to hay-packed boxes, driven home, and liberated immediately in a large double platypusary at the Sanctuary. In all, nineteen of the animals were secured over the three weeks' hunt, and only three of the total were males. Adult males appear to exercise sovereignty over certain stretches of river and, being also far more wary than females, are exceptionally difficult to catch. Except for the baby males found so frequently in March in Victoria, I can count on the fingers of one hand all the males I have ever captured.

Careful observation of the behavior of captured

animals was carried out in order to determine which three (a male and two females) were outstanding in the matters of temperament, willingness to feed, and general adaptability to civilized conditions. I considered three animals an ideal number from the point of view of food supply, provision of homes, and show. To feed and house more than three would have been impossible, particularly in view of the presence of Jack and Jill and Corrie, our own Platypuses.

Eventually two very small baby females, christened Betty and Penelope respectively, and the youngest of the males, named Cecil after my able first assistant, Mr. Cecil D. Milne, were retained. Six others were flown by plane for liberation in South Australian streams, as this state does not have the animal naturally in its rivers. By governmental arrangement they were released in selected spots immediately on arrival. The remaining ten were returned to local Healesville rivers.

After a month it was found that Cecil would partake of steamed egg custard—a most important discovery in regard to the general undertaking of catering for their insatiable appetites. Also, to our delight, it was found that Cecil, though not friendly, was really a placid fellow—and that, in a male Platypus, is really remarkable.

At the time of capture Betty and Penelope were no more than four and a half months old; Cecil was approximately a year old and three-quarters grown.

It was some weeks before it could be regarded with certainty that the three had really adapted themselves to the platypusaries, and for this reason close watch by night was essential. Jill, our famous female Platypus who had twice laid eggs and who hatched and reared the only youngster known in captivity,¹ was used as a "pilot Platypus." Her very boldness at display periods played a large part in the eventual successful behavior of these two young females. Betty, however, was the first casualty. She lost condition, her tail dwindled in size, and one eye became opaque with obvious loss of sight. Things looked black. I had designed travelling platypusaries which were being built in Melbourne, 45 miles away, for at that stage Mr. Osborn had suggested that we leave at the

¹ The Birth of a Baby Platypus. By David Fleay. *ANIMAL KINGDOM*, Vol. XLVII, No. 3, May-June, 1944, pp. 50-69.

end of May of that year (1946) for New York. Since she was not adapting herself to the large permanent platypusary at the Sanctuary, it seemed unlikely that Betty would accept an even smaller contraption. I took her down to the river one morning and released her with the intention of finding a replacement. However, she refused to swim away and returned to the bank, so I had to bring her back. That night Betty was cold, stiff, blind and obviously dying. I placed her in a bag on warm pipes for the night and came along the following morning with a formalin jar, fully prepared for a dead animal. To my surprise, she was moderately lively, though painfully emaciated. Returned to the swimming pool for a feed, she ate egg custard for the first time. Thereafter her progress, literally and truly back from the grave, was phenomenal. Within three weeks the opaque eye had regained normal vision and both she and Penelope—largely due, as I have mentioned, to the competition and example of Jill — became most captivating little

creatures. Cecil, however, maintained his reserve though proving, as had been observed earlier, placid in his general behavior.

The portable platypusaries arrived by truck in early May and were completed at my home. They measured 12 feet long, 3 feet wide and 3 feet high in Cecil's particular piece of architecture, and 14 feet long, 3 feet wide and 3 feet high in the slightly larger version reserved for the two females. It was important that the male animal be housed separately, for fear he should use his venom spurs with malicious intent.

Now began the most difficult and despairing part of the actual conditioning process—in fact, of the entire operation. Introduced to their smaller, travelling homes, the animals fretted and refused food. Betty and Penelope refused to return to sleeping quarters at dawn and swam frantically with all the oil gone from their soaking-wet coats. I returned them to the permanent platypusary and they regained equilibrium, but took days to do so.

A baby Platypus is a snub-billed little thing. This is Corrie, the first Platypus hatched in captivity, at Healesville; she was 8½ weeks old at the time this picture was taken. Her eyes were not yet open, her tail was cylindrical rather than flat, and her fur was short and satiny. Corrie was helpless at this age; at four months she left the burrow and could swim quite well.

David Fleay Photo



Cecil took matters more calmly, but within ten days he was no longer cosy and furry in his nest. He was wet, starving and definitely deciding to die. He, too, was returned to a larger platypusary.

Strangely enough, the provision of a hiding board just above the water and the blocking of just one tunnel exit was all that Cecil needed, and after we pandered to these idiosyncracies he settled down.

The two females, however, presented endless difficulties. No amount of alterations of burrows or pool made the slightest difference until I had the galvanized iron swimming bath in the travelling platypusary scrapped and substituted a solid, four-inch-thick, reinforced concrete tank. Then, with the identical block of burrows added to this new tank, Betty and Penelope decided by means of their amazingly sensitive bills that the solid nature of their two-ton platypusary was now satisfactory. Immediately they settled down as if they had lived there all their lives. At long last, after months of trouble and removals back and forth, they rested content.

News from New York had indicated that preparations there had been delayed, necessitating an eleven-months' postponement of the actual journey, and this, in view of the trouble experienced with the animals, was really of considerable importance in contributing towards the eventual success. The Platypuses had time to grow to healthy, vigorous maturity. New and very handsome fur coats were grown after the molt of January and February, 1947; they became thoroughly used to appearing before the public with the attendant noise and bustle. Cecil and Betty grew to accept egg custard as a usual part of their diet, through Penelope, like Jill—an outstanding show animal—never grew to like it and never will. Quite by accident Cecil revealed a Platypus habit hitherto unknown to us; he would catch, kill and eat fully-grown frogs of at least three species. That was a very useful and helpful item in catering for him. How our worm digger, Mr. Douglas Barber, of Badger Creek, ever managed to secure the amazing daily total of 3,000 to 4,000 earthworms, several hundred yabbies (crayfish), not to mention chafer grubs and frogs, will always be a mystery, though an amazing example of "heavy industry." Probably never

again—for their own sakes I should hope never again—will anyone have to worry about feeding six ravenous Platypuses for a whole year.

So heavy was the quantity of soil, worms, grubs and the like, that each evening it was necessary to journey up to six miles by car in order to carry the nightly ration from the valley of the River Yarra, where it had been dug, to the Sanctuary. Fortunately the summer months of 1946-1947 in southeastern Australia were not exceptionally dry. Otherwise the procurement of Platypus food would certainly have come to an impasse. Barber eventually became ill through overworking and had to send for his son and call on his brother to help him continue the worm and grub supply.

In December twelve strong boxes, 3 feet square by 12 inches deep and covered by flywire screen lids, were constructed for storing live worms and grubs in soil for the trip to New York.

In January the Barbers and an Australian aborigine began collecting food in earnest for the actual trip. Thousands of worms and yabbies were frozen in several huge blocks at the Healesville ice works. In February, worms and grubs were placed in soil in the boxes, covered with turf and kept moist. Altogether, we had 7,000 frozen yabbies, 136,000 frozen worms, 22,000 live grubs, 23,000 live worms and 45 live frogs of four acceptable species. Duck and hen eggs were preserved and held ready as well.

Visiting the S.S. *Pioneer Glen* of the United States Lines in Melbourne on her way to Adelaide, we interviewed her master, Captain Marlowe, and made arrangements for housing the Platypuses and their food during the long voyage ahead.

On account of a last minute hitch with the Trade and Customs authorities at Canberra, who control the export of rare animals and birds from Australia, Mrs. Fleay and I were unable to sail on the *Pioneer Glen* when she left Melbourne or even to supervise loading of the platypusaries and food. Those last days were a nightmare, with flying trips back and forth to Canberra and everything in the balance. However, on the morning of Thursday, March 27, 1947, we actually set off from Badger Creek Sanctuary with the early-awakened Platypuses in separate, small and very light travelling boxes filled with dry grass. Here

at last, after 12 months of preparatory stages, had come the crucial test of all — the long, trying journey by land, air and sea to New York. And we had no illusions concerning it.

The car taking us to Essendon aerodrome, Melbourne, was the local undertaker's best mourning coach, and we couldn't help wondering if it augured well for the future! We had also in the car two tin boilers containing hundreds of additional frozen yabbies, gathered after the ship had left Melbourne for Brisbane, and frozen in our home refrigerator. Penelope showed her displeasure by scratching on the wall of her wooden box practically all the way to Melbourne.

We held our first inspection of our flying Platypuses at Mascot aerodrome at Sydney, where there were a number of newsreel cameramen and newspaper photographers waiting. Betty appeared dazed after her trip by air. She was given the opportunity to have a drink and a short swim in a hand basin in the Australian

National Airways Administrative Building.

A. N. A. were most helpful in the difficult task of transporting these sensitive and temperamental animals and had fresh ice ready and waiting for us to place in the yabbie tins.

At Eagle Farm aerodrome near Brisbane that afternoon we stepped off the Skymaster and made for the *Pioneer Glen*, rather fearful about the welfare of the bewildered Duck-bills after their initial thousand mile journey with its varying altitudes up to 10,000 feet.

The platypusaries in which the three had spent the greater part of a year, and also the blocks of frozen worms and yabbies, the eggs and the boxes of live grubs and worms, five boxes of breeding and growing mealworms and several bales of hay, awaited us on shipboard. The platypusaries were enclosed in a specially built, wide-spaced board shed erected on top of No. 4 hold just aft of the superstructure housing the officers and crew of the ship. The shed and platypusaries



David Fleay Photo

This Platypusary came to New York as the travelling home of Betty and Penelope. The section at the left is the concrete swimming tank with high wooden sides; at the right the long box contains the hay-filled wooden tunnels in which the animals slept. A slightly shorter Platypusary was constructed for Cecil. On account of his dangerous spurs he was kept isolated.

were well braced and had a roof formed of a huge tarpaulin securely lashed.

Before our arrival, Mr. George Mack, Director of Queensland Museum, had appealed for even more worms and yabbies, and we managed to collect a most useful addition to our supply of fresh food. Live yabbies, as a result of being placed in the ship's cooler at 40 degrees F., lasted for over a fortnight.

The ship did not sail until Saturday, March 29, and although the animals behaved normally regarding coming out into the water at night and going into their grass-filled tunnels during the day, they appeared to be stupefied and fed scarcely at all.

Captain Marlowe, who had brought "Doreen" the Bongo, still resident in the New York Zoological Park, as a passenger on a previous ship of

his in 1933, proved most interested in this new venture and was anxious to do all that he possibly could to make it successful, even to the length of consulting me as to the advisability of toning down the ship's siren!

After dark on Thursday, our first night on board, we found two big search lights blazing away, one to port and one to starboard of the platypus shed (which, incidentally, was labelled the "Pioneer Glen Zoo"). The lights were to prevent sabotage, Captain Marlowe said, but he readily agreed to turn them off. Otherwise the animals would never have come out to feed! Later on, at sea, when I mentioned the matter of deck-chipping in preparation for painting, all work of such nature was immediately suspended in the Platypus vicinity.

After leaving the Queensland coast, the sea be-

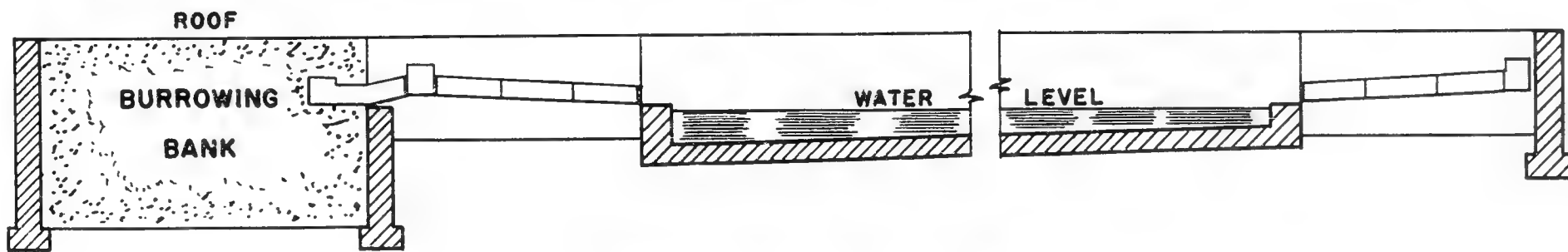


David Fleay Photo

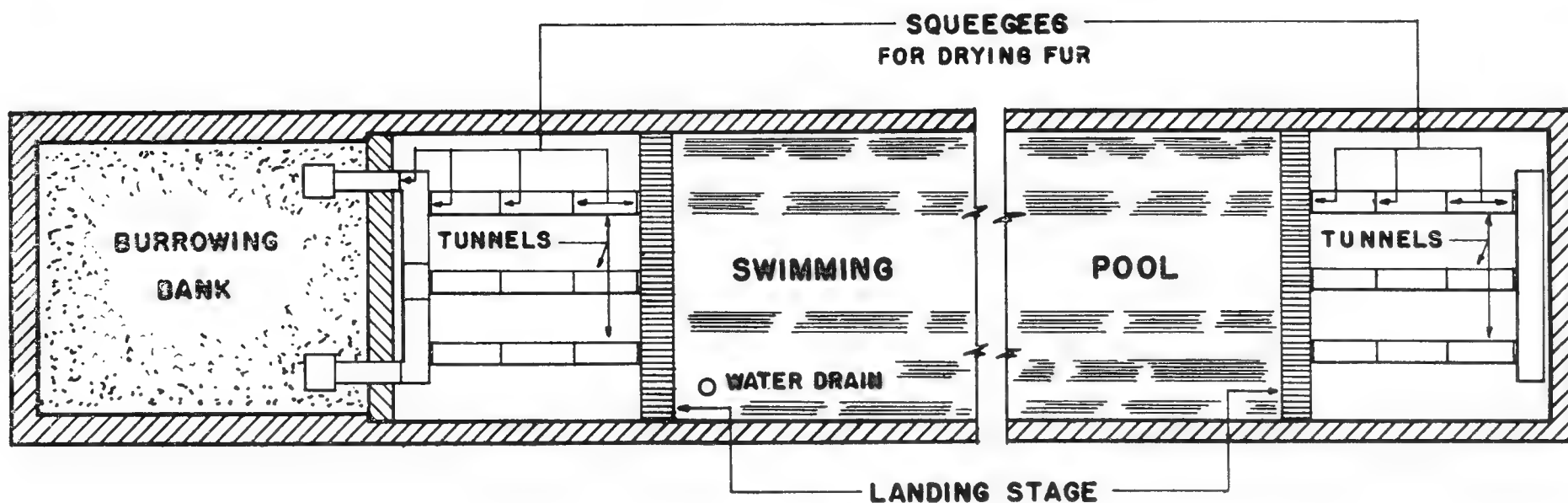
"Pioneer Glen Zoo," the sailors aboard the United States Liner "Pioneer Glen" called this structure on the afterdeck in which the three Platypuses, two Echidnas and (after Panama) an assortment of Bats, Sloths and Opossums came to the United States. The two travelling Platypusaries were stowed inside the tarpaulin-covered "house." Mrs. David Fleay is at the right.

THE PLATYPUSARY

A MAN-MADE REPRODUCTION OF A PLATYPUS HABITAT



LONGITUDINAL SECTION



PLAN

A permanent Platypusary, 47 feet long, was constructed in the Zoological Park in anticipation of the arrival of the Platypuses. It contains a swimming pool 20 feet long and 6 feet 10 inches wide in which the animals feed and are exhibited every afternoon, beginning at 3 o'clock.

came rough, and the ship rolled and pitched and shuddered when the propeller came momentarily out of water. There was a big barometric depression coming down from the north, another coming up from the south, and a smaller one moving in from the west. After studying the weather reports, and with the Platypuses' well-being in mind, Captain Marlowe decided to sail due east instead of east-by-south until we should be clear of the depressions and bad weather. A few days later, when he eventually decided to go east-by-south, he told us of the change of course and asked me to keep him informed of the effect on the Platypus family.

The first few days at sea were days of darkest despair as far as I was concerned, but Mrs. Fleay shone as a morale builder! The Platypuses ate very little, even though supplied with fresh and frozen worms and yabbies, choice fresh grubs,

mealworms and egg custard. A little of the fresh food was eaten — none of the Duck-bills even sampled the egg custard and none of the frozen food was touched. The chances of getting the animals to New York alive seemed extremely slight. Both Betty and Penelope had discharges of mucous from their nostrils, almost certainly after-effects of rapidly changing altitudes and vibration during the plane journey from Melbourne to Brisbane. I felt that my decision to avoid air travel over the whole route from Australia to New York had been amply justified. One week after leaving home the male Platypus ate a normal meal for the first time, but it was not until a week after this that Betty turned the corner and behaved at all rationally. Previously, she had lost interest in preening herself and her fur had become patchy and unkempt. She would clamber on the landing board of her swimming

tank and scratch incessantly, a sign of distress, and grind her jaws together repeatedly in annoyance. There is no accounting for the reactions of the unpredictable Platypus, for Penelope, so uncertain on land, proved by far the best traveller of the trio and would roll on her back in enjoyment of the warm water, even in rough seas.

Vertical baffle boards had to be placed midway across the tanks in each platypusary in order to prevent the water from slopping from one end to the other during rolling of the ship, and knocking the animals about. It also prevented the entry of any large quantity of water into the elevated wooden tunnels leading to the sleeping quarters.

Although the Platypuses gradually settled down and Betty's and Penelope's cold and distressing sneezing eventually disappeared, they still gave us cause for anxiety. As they had now shown a reversal of land behavior and refused to countenance frozen food, I asked Captain Marlowe to radio Pitcairn Island asking for as many earthworms as the islanders could find and offering to buy them at the rate of \$1 for 6 pounds of worms.

On Tuesday, April 8, Mr. Nelson Dyett, the New Zealander in charge of the Pitcairn Radio Station, told us that they had a good supply. This was encouraging, and an hour before midnight the *Pioneer Glen* halted a mile offshore where fourteen Pitcairn men, descendants of the mutineers of the *Bounty*, were waiting for us in one of their typical boats. Huge lights hanging over the side of the ship illuminated the scene as five kerosene tins of worms were hoisted aboard. Unfortunately, the worms in three tins were quite dead, but some of the peculiar, thin, pinkish live worms in red volcanic soil were given to the Platypuses that night and not a single one was seen next morning when the tanks were strained and emptied as usual. The rest of the live worms were placed in the ship's cooler and proved a Godsend as an addition to the diet of the animals. Of the fresh worms and grubs loaded at Melbourne, only a handful remained in the storage boxes at Panama. Mealworms stored in an enclosed space aft and just over the propeller shaft, where the temperature was at least 100 degrees F., grew almost visibly, and provided food for the whole of the trip. Fortunately, the ship carried plenty of fresh water,

which enabled us to refill the swimming tanks daily. Sometimes Penelope appeared between 4 and 6 p.m. of her own accord and occasionally Betty would accompany her as they had made a practice of doing at Badger Creek. Their rhythm had been upset owing to our continual eastward travel with consequent progressive alteration of time.

Although we reached and crossed the Equator before Panama, it remained mercifully cool, due to the strong trade winds. However, on hot evenings before the Platypuses came out, blocks of ice were placed in the water. Some days were very hot with air and water temperatures well up in the 80's. On one particular day, with the temperature at 90 degrees, Betty's head and beak projected upside down and motionless from the burrow entrance. However, as I watched, the whistle blew for boat drill and she revealed that she was still very much alive!

Each evening before the bulk of the Platypus food was put in the tanks, the female Platypuses had an audience of admiring officers and members of the crew anxious to watch them sporting in the water. The visitors were permitted to feed them mealworms and grubs and so were able to feel the soft, rubber-like bills nuzzling their hands. The Chinese boatswain, messboys and chefs were very keen on seeing the Platypus and speculated on whether it had a face "like a lat" (rat!). After giggling and feeding them, they would retire outside the shed and hold a long gabbling sing-song conference in Chinese. It was an interesting show there on the vast Pacific with the flying fish scudding across the swell and the red sun sinking behind the ship.

Having been prevented from adding the all-important final supply of fresh food before the *Pioneer Glen* actually left Melbourne, we were, in spite of the worms from Pitcairn, still in need of more, largely due to the fact that the Platypuses refused their frozen food. Before reaching Panama we radioed New York for an additional 10,000 worms to be flown to Balboa.

Mr. Osborn radioed back saying that the worms were being "convoyed" by Mr. William Bridges. In due course, Mr. Bridges delivered his squirming charges in perfect order and on a balmy night in Balboa we sat beneath a banyan tree discussing plans for unloading and exhibit-

ing the Platypuses, for completing the permanent platypusary, and for housing the two Spiny Ant-eaters which we had also brought with us.

The food from New York consisted of three species of earthworms, largest of which were the so-called "night crawlers," and for these the two female animals showed a decided preference. Unfortunately, however, Cecil had shown signs of nervousness because of the heat, lights, noise and bustle at Balboa, and he began a hunger strike which lasted throughout the remaining week of the voyage, through the Caribbean and up the Atlantic coast to Boston. He ate a few mealworms, but refused egg custard and earthworms. I thought that perhaps the pungent odor of two Two-toed Sloths, which we had consented to nurse from Panama to New York, had helped to upset him, but even the removal of these sluggish creatures failed to restore his pre-Panamanian form. An additional complication concerned the percentage of chlorine in the distilled water taken on at Balboa. I worried, and the Captain worried to the extent of muting the fog

horn on nights of fog, so that Cecil's distressed state of mind should not be aggravated.

Then, on a famous morning, Friday, April 25, Anzac Day indeed, we stepped on American soil at the port of Boston with the three Platypuses intact. It was the first time that female Platypuses had ever landed on a foreign shore, and only the second occasion on which a male of the species had successfully travelled abroad—the first time, of course, being just 25 years ago, in 1922, when a male Platypus lived for 49 days in the New York Zoological Park.

Awaiting us on the dock were two representatives of the Zoological Society, General Curator Lee S. Crandall and Mr. Bridges. Customs formalities melted magically, but our troubles were not yet at an end. Bearing in mind our near-tragic experience in flying the animals up the Australian coastline, we made the run to New York that day in a seven-passenger limousine, the Platypuses once more riding in their small, hay-filled boxes. The two big platypusaries were loaded on a truck and were to follow our lim-

Platypus preview! On Tuesday, April 28, several hundred members of the New York Zoological Society and Australian officials came to the Zoo to see the Platypuses put on exhibition for the first time. Here Mr. Fleay and Ambassador Norman J. O. Makin are holding Penelope.



ousine. At 6 p.m. the animals arrived at the Zoological Park, and on that cold rainy night we settled down in the Animal Hospital with the staff of the Park to await the platypusaries. With the coming of darkness, the animals were scratching feverishly to get out of their little travelling boxes and commence the night's aquatic activities. Seven, eight, nine o'clock went by, and we had the two females in a large tub with food while Cecil was transferred to the bathtub in the apartment of Mr. George Scott, Headkeeper of Birds. Mr. Scott's bath was a sight to behold when it contained mud, worms, small crayfish, egg custard and the male Platypus. Came 10 p.m., 11 p.m., midnight, 1 a.m., and then 2 a.m., and still no truck. The situation was desperate, because Betty and Penelope would feed and swim haphazardly for 20 minutes or so, and then make frantic efforts to escape. To quiet them, removal to the travelling boxes was again necessary; but within half an hour or less, they made further efforts to return to water. It became an all night session of move and counter-move, for the truck men did not appear until the next morning, and little sleep was obtained by anyone. Cecil swam about the bath until dawn and then splashed vigorously, endeavoring to find a burrow to retire to. That was a night of nights and one of the most extraordinary happenings of the

13 months' Platypus venture. I trust I shall never have to live through another such night.

With the setting up of their own travelling platypusaries once more, all three animals were able to enjoy a much needed rest period. Though this was a matter of days only in the case of the females, it was nearly three weeks before Cecil showed signs of normal appetite and behavior and until that time he was not disturbed, or shown. Extra items supplied to build him up included "yabbies" from Louisiana, and leopard frogs from Georgia.

The climax of the undertaking came on Tuesday, April 28, at the preview exhibition for members of the New York Zoological Society at which Mr. Norman J. O. Makin, the Australian Ambassador to the United States, was present to introduce the "two girls" for the first time in the tank of the permanent platypusary. Australian and American flags waved gaily and the sun shone after days of cold rain. It was a great day, symbolizing the end of an involved and hazardous undertaking, and for the Duck-bills the beginning, we hope, of a contented and healthful life in America, to whose people they should give endless pleasure, delight and wonder.

We shall miss these pets we have nursed for so long, but we are happy to know that they are in appreciative hands.

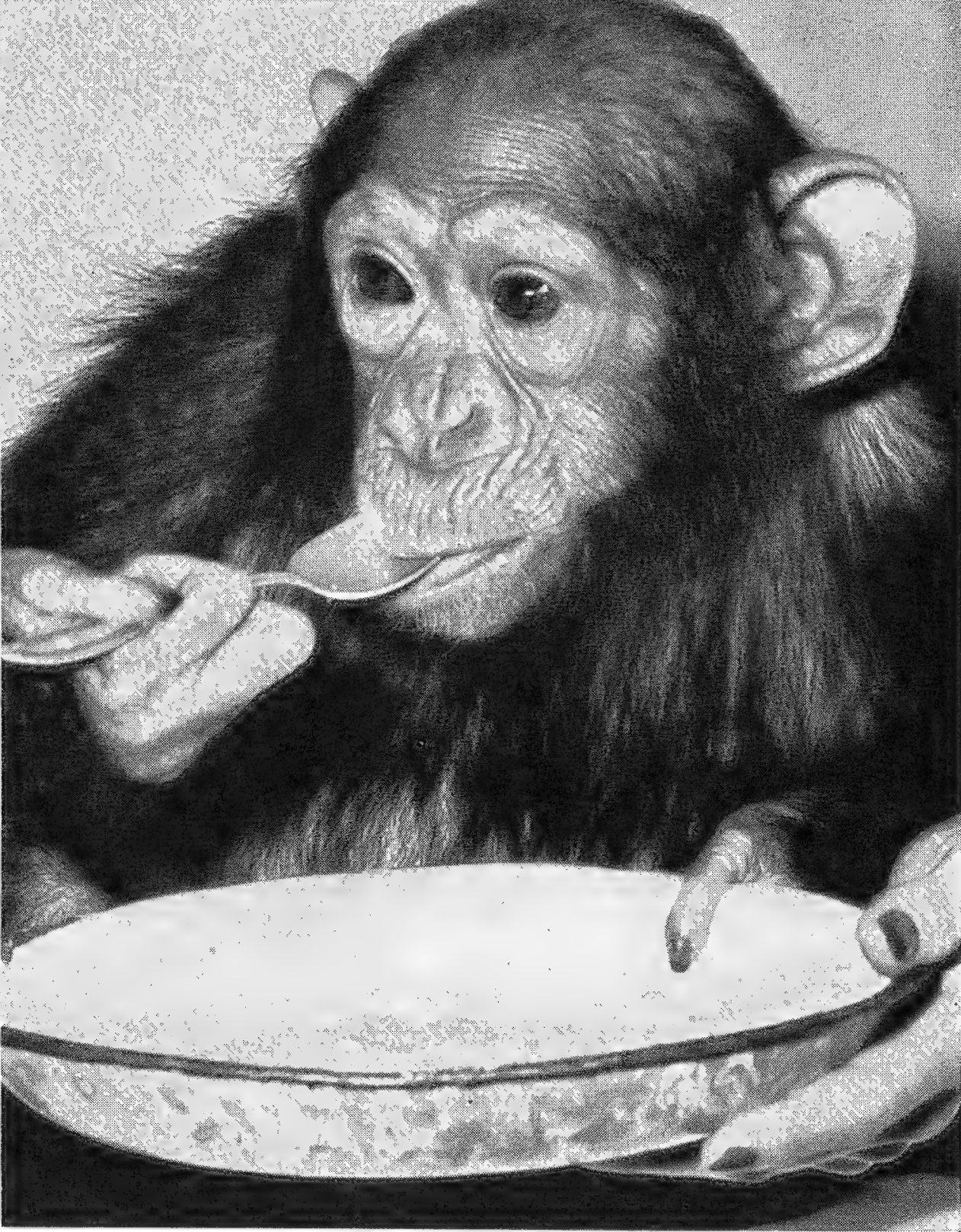


WAITING TO SEE CECIL, BETTY AND PENELOPE



Checking Up on Josephine

SEDATE is a word seldom applied to baby Chimpanzees, but it describes little Josephine. She was born about three years ago in French Equatorial Africa, and when the Zoological Society acquired her last September she had been for some months a pet in the home of an European woman in Brazzaville. Her grave deportment, her slow deliberate movements, did not necessarily mean poor health—certainly her appetite has always been good—but when she arrived at the Zoological Park a number of routine tests were made in the Animal Hospital.



When a patient enters the hospital, it is customary to fortify him with a light meal. To Josephine, a light meal consists of a pint of sliced fresh fruit, a bowl of cornmeal mush.

Dr. Goss and Nurse Murin made the usual tests, including a series of X-ray examinations. Josephine cooperated fully, although she had a tendency to want to handle all the apparatus in the laboratory and make her own tests by transferring it to her mouth. At the end of a week, Dr. Goss was able to report that Josephine appeared to be in almost perfect health.



Plenty of liquid intake is what the Doctor ordered, so Josephine was offered a cup of m





Josephine doesn't have to be babied; long ago she learned to hold her own drinking glass.



When it comes to eating and drinking, Josephine is not so slow; milk vanishes quickly.



Patient Discharged!



One glance at the Aquarium's new type of fish tanks, and their superiority is apparent—instead of an artificial-looking back wall, the water simply fades away into a mysterious blackness out of which the glittering fish emerge to swim in full public view. These are Goldfish.

New Tanks for Old

By JAMES W. ATZ

MEN HAVE BEEN KEEPING FISHES as pets for at least 2,500 years but they still haven't solved the (what would seem) simplest and most elementary problem—an ideal exhibition tank.

We're not boasting . . . but the New York Aquarium has invented a tank that comes pretty close to the ideal.

Oddly enough, exhibition tanks have been such a problem that small, glass-sided aquaria did not come into even limited use until less than a hundred years ago—in the second half of the Nineteenth Century. The first public aquarium in the world consisted of a number of these small tanks set up in a "Fish House" in the London Zoo. Although it was popular and instrumental in promoting the hobby of keeping fish at home, diffi-

culties in maintaining marine creatures brought about its closing; not until the early Eighteen-seventies were the first permanent public aquariums opened at Blackpool, Brighton, Frankfurt and Naples. These were the institutions that met and solved the initial problems of constructing water-tight tanks with plate-glass windows, of circulating, filtering and aerating water, and of employing reservoirs. It was from these and similar institutions that the builders of the old New York Aquarium turned for advice in the tricky business of building a plant for the exhibition of aquatic life.

At this point tropical fish fanciers and folk who have maintained successful home aquaria may begin to wonder at talk about problems, expense and trickery. Why, after a tank is set up, you hardly have to look at it for days on end!

To this we reply: Quite true, but home aquarists are dealing with relatively small amounts of standing water. Even so, just try to lift one of those tanks.

You can't. It's too heavy, with all that water in it. And that is an illustration of the first great and fundamental difficulty in aquarium management: the weight of water. One gallon of the stuff weighs 8.3 pounds; consequently the water in a fifteen-gallon tank—one big enough comfortably to contain six small goldfish—weighs 125 pounds. How many pounds of water does it take to keep one five-foot shark? Conservatively, about six tons—12,000 pounds! It is not surprising, then, that the water in the new Aquarium we are planning to build at Seaside Park, Coney Island, weighs about 6,000 tons, or twelve million pounds.

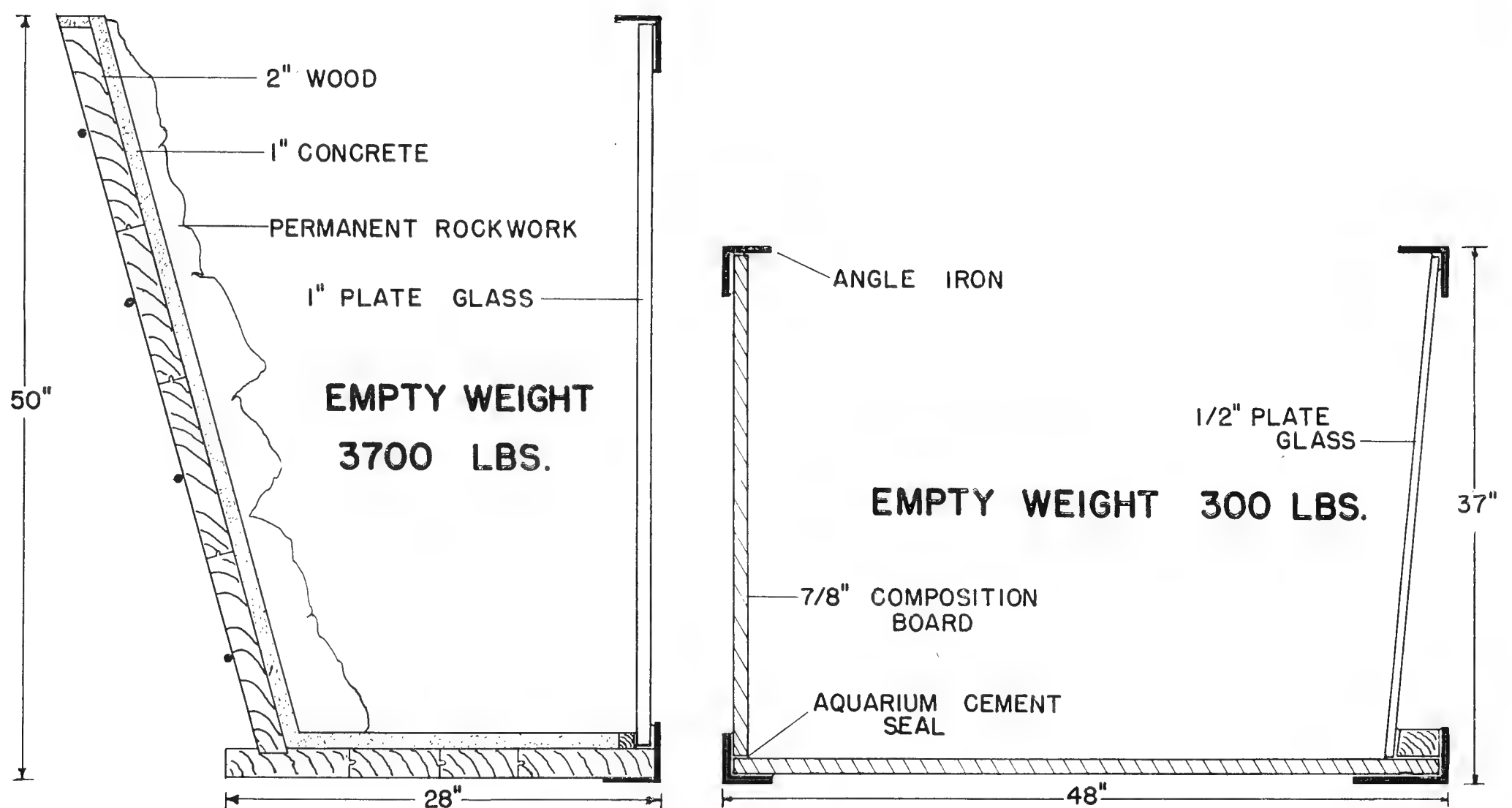
Not only is all this water very heavy, but it exerts *pressure* on whatever contains it, and water pressure is the second fundamental difficulty in aquarium management. Since water is a liquid, the pressure it exerts depends directly on its depth. It makes no difference whether a tank be as small as a hat-box or as big as a city block; if the depth of water is the same in both, the pressures exerted on the bottom or sides of both containers will be identical. Water only 28 inches deep presses out in all directions against the bottom and lowest part of the sides of its container with a force of one pound per square inch. A tank with six feet of water in it must therefore be able to withstand pressures of over two and

one-half pounds per square inch, the average pressure on each side being 1.3 pounds per square inch. This may not seem very much until one realizes how many square inches there are in the sides of a tank—for example, 10,368 of them in a six-by-twelve-foot one. The *total* force constantly being applied to each side of such a tank, when filled, is more than six tons!

Confronted with these tremendous physical forces, the early designers of aquarium tanks resorted to the strongest water-proof substance they knew: reinforced concrete. Thus up to the present day practically all the tanks in public aquariums have been constructed of this material. For more than fifty years concrete did the job, and satisfactorily up to a point. It still is the best material we have for making very large tanks. But for medium-sized ones—the most numerous type in an aquarium—it is much too heavy. A concrete tank, four by four feet in area and three feet high, weighs a ton and a half without water. Once made, it must stay in one spot for the rest of its existence.

After the closing of the New York Aquarium in Battery Park, Curator-Aquarist Christopher W. Coates set about to design a new kind of medium-sized tank. With modern materials and methods, he reasoned, the old-fashioned, excessively heavy tank could be "stream-lined" and made lighter, better and cheaper. His first proposition was that a 300- to 600-gallon tank could and ought to be made in the same general way as a small home aquarium; that is, not like a solid box, but with a series of plates held together by a supporting frame. No aquarium so large had ever been made this way before. For one thing, the new design would quadruple the number of joints which must be sealed water-tight. It would also necessitate the discovery of a substance strong enough, when made in relatively thin sheets, to withstand over-all pressures of more than a ton.

After testing many substances, it was discovered that certain pressed-wood and die-stock composition-boards would meet requirements and that two and one-half to three inch angle-iron could be used for the frame. By observing certain precautions, Curator Coates and the Aquarium's crew were able successfully to build their first new tank:



The old-style tank at the left has a slanting back because refraction would make it appear to lean forward, otherwise. Notice the heavy construction of the old tank. The new model, on the right, has a slanting front to eliminate reflections. It weighs less, holds more water and fish.

1. The frame must be perfectly true and the welded joints smooth.
2. Only well hand-worked aquarium cement of highest grade is used for sealing joints.
3. A scant one-quarter of an inch is allowed all around for cement seal, but this must be carefully filled so that no air bubbles are present.
4. Wall boards are completely sealed off from both water and oil of cement by Black Asphaltum varnish.

We have gone a little ahead of our story, however, because the selection of proper materials was only part of the work preliminary to actually making the tank. A suitable shape also had to be chosen. Offhand, the shape of a fish tank may not seem to be a matter on which much thought could be expended, but there are four diverse sets of requirements—some diametrically opposed to others—that somehow have to be fitted together before a satisfactory unit can be produced. “The ideal tank,” Curator Coates states, “is the best possible compromise one.” First, of course, are the requirements of the public, for whom the tank is being made. Next are those of the fishes that must live in it. Thirdly, the needs of the tankmen who take care of the fishes must be considered;

that is, the tank should be practical to work with. Lastly, the tank must be mechanically feasible and not too expensive to construct.

We have already spoken at some length about the latter item and have seen that a deep tank requires very heavy construction to withstand great water pressure. Moreover, such a tank is difficult to work, the tankman often being forced to enter it bodily to accomplish his cleaning and maintenance. Fortunately, only a few fishes prefer deep water when kept captive; the great majority do very well in three or four feet of water.

What fishes do require is a favorable surface-to-volume relationship in their tank. By this we mean that for every cubic foot of water in an aquarium, large or small, there must be at least a square foot of water-surface, preferably more. No one knows exactly why fishes live better in relatively shallow tanks; but they do.¹ In fact, the ideal tank for most fishes would extend so far back from its front glass that the public could hardly see the exhibits. On the other hand, the ideal tank for the visitor would be so narrow that it would keep the fishes always up towards the

¹ We are positive, however, that other physiological or psychological factors besides fishes' dependence on atmospheric air are pertinent.

front—and would kill them in short order.

Another source of trouble is the chemical activity of waters in which fish have lived. These will attack almost every kind of metal, including those alloys resistant to ordinary corrosives. Even though the metallic break-down may proceed quite slowly, an almost imperceptible amount of it in solution is enough to sterilize or kill most fishes and practically all invertebrates. There is only one paint-like substance, Black Asphaltum varnish, which can safely be used inside an aquarium, and most of the new plastics react with fish wastes.² The materials available for tank construction are thus quite restricted.

All these points had to be kept in mind while determining the dimensions of the new tank, and Curator Coates has told how he began: "By long experiment, we have found that the maximum visibility into a fish tank set in a wall is obtained by a glass front with a height of about three feet, with its base about the same distance above the floor. Such a depth of water does not require too heavy walls to retain it, nor too great surface to offset it. Therefore, we took this dimension as our basic one and designed a tank around it." A depth of water of thirty-two inches with a surface area bounded by four feet on each side was decided on, since this gave a volume of 300 gallons as well as providing a tank of satisfactory size for both tankmen and many fishes. When construction was started it was found that the time necessary to set up the new tank, once the materials were assembled, was several hours, as compared with several days needed to put together one of the old type.

Although this new model tank holds more than twice as much water as the old tanks made for the building at the Battery, it is only one-fifth as costly and weighs only one-twelfth as much—300 pounds as against 3,700 pounds. This means that it can be moved, when empty, to any place desired.

Mobility of exhibits is the keynote of the new Aquarium and one of its most distinguishing and progressive features. All previously-built public aquariums have been immobilized by their own buildings, being literally cemented into them. Only the largest tanks at the new Aquarium will

be immobile, allowing many degrees of freedom in presenting most of our exhibits.

Movableness does not stop with the tank as a whole, however, but has become an integral condition *inside* it as well. Since the old type of tanks were made either wholly of concrete or of heavy wooden box-like containers lined with at least one inch of that material, they presented a drab and usually discolored background for living exhibits. Tile was employed as a finish at one time, but this created a most unnatural, bathtub-like effect. It was therefore necessary—in all but the largest tanks, where the back was invisible—to beautify their walls with rock-work, set as naturally as possible. Although the effect was good if done by highly-skilled labor, this method of decorating an aquarium was not satisfactory for several reasons. In order to fasten the rocks securely to the concrete sides of the tank, they had to be embedded in a rather thick layer of the same substance, and this, plus the thickness of the rocks themselves, displaced too much water and added too much weight. Moreover, once set up, they could not be changed without completely tearing down and rebuilding the entire interior of the tank, a costly and time-consuming task.

Curator Coates conceives of each tank in the new Aquarium as a stage, with the fishes and other animals as actors, and the backgrounds, rocks and plants as "drops" and "props." In keeping with this idea, it is planned that rock backgrounds will be made in relatively thin slabs, which can be set in a tank just as a backdrop embellishes the rear of a stage. A change can then be effected simply by lifting out one slab and replacing it with another.

It is also possible to do away with rock-work backgrounds altogether by relying on black-colored walls which fade away and give an impression of infinite distance when viewed through as little as four feet of water. In such a bare tank, fishes seem to appear out of nowhere and to drift off into the unknown—all within the confines of their small microcosm.

The flexibility of these new tanks is astonishing. In five minutes their whole character can be altered from, say, a representation of a rock-bound tide pool or a fragment of a coral reef, to a bit of the wide open sea.

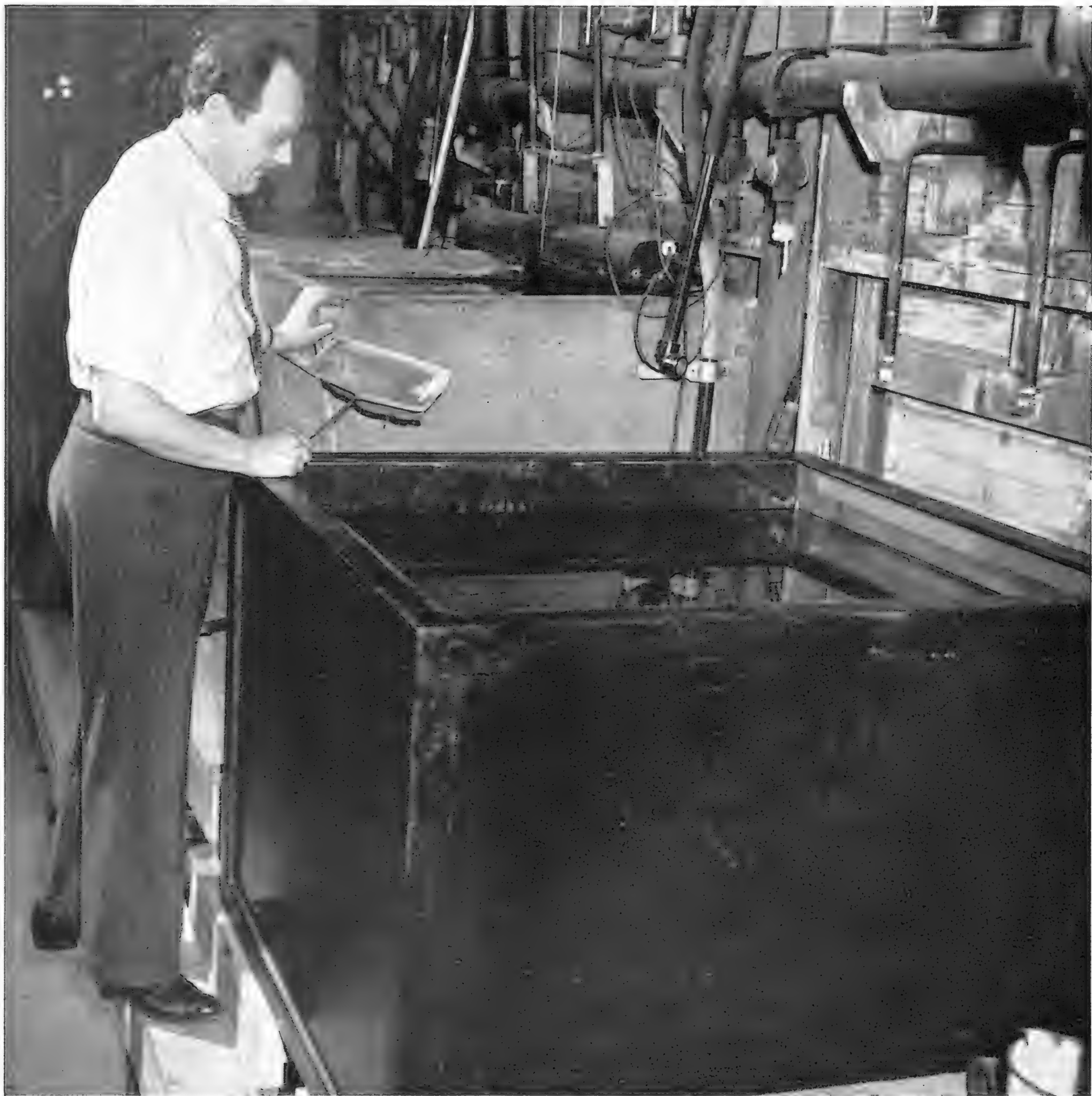
The fishes, too, benefit from living in a change-

² See "Pumps Are a Problem, Too," in *ANIMAL KINGDOM*, May-June, 1946.

able aquarium. That some of them suffer from ennui which gives rise to fighting and other bad habits Curator Coates is quite sure. By slightly altering the coral reef in their tank every two or three days, he has been able to keep Beau-gregories, notoriously pugnacious fish, living peacefully together for an indefinite period. Apparently the fish are kept so busy becoming acquainted with their ever-changing environment

that they never get around to quarreling.

Tanks are but one of the conundrums of public aquarium construction. Piping, pumps, filters, water-heaters, reservoirs and lights must also be carefully designed and experimentally tested. The Aquarium's staff is at present busy with architects and engineers, planning the great *new* New York Aquarium and solving many of these old, old problems in new and better ways.



Curator-Aquarist Coates prepares to dip a fish out of one of the Aquarium's new tanks—an easy operation, for the water is shallower than in the old-style tank in the background. The greater horizontal depth of the new tank, as against the vertical depth of the old, is shown.

Bird-collecting Adventures in Guatemala

By CHARLES CORDIER

IN THE LATE FALL of last year my wife and I found ourselves at rather loose ends in Guatemala. More than half a year's work had gone into the collecting, rearing and shipping of Ocellated Turkeys, and now we were free to assemble a collection of birds for the New York Zoological Society. We had a few cages of Toucans, Trogons and Flycatchers, but nothing really worthy of the Society, and it would be necessary to make a major effort in the interior. I could draw on the previous six months of experience, and a stay of some thirteen months in Guatemala nine years before; besides, I possessed Griscom's valuable "Bird Life of Guatemala."

Such was the equipment that I reported to the Zoological Society and Mr. Lee S. Crandall, the General Curator, who has done a good deal of collecting himself and knows what one is up against, showed great understanding of our plight and gave the go-ahead signal.

The town of Coban in the Department of Alta Verapaz, altitude 4,500 feet, is mentioned on almost every page of Griscom's book. It seemed a likely place to start and it was easily reached by half an hour's flight from Guatemala City.

The hotel keeper who can love and welcome a bird collector must be either a paragon of sympathy or a monument of shiftlessness. The keepers of the best hotel, and the next best, in Coban, were neither sympathetic nor shiftless; in short, when we arrived from the airport they glanced at our 1924 touring car, bulging with cages, nets, suitcases and boxes, and found that they had no vacant rooms. The character of the keeper of the only other hotel in Coban I can best describe by saying that he willingly took us in, put three rooms at our disposal — one to live in, one for the birds, and one for a workroom in which I might hammer and saw even with the

Sometimes the collector begins to wonder if the birds he is seeking really exist, so elusive are the rarest specimens.

door open — and that he was so lethargic that we ourselves had to make up our weekly bills so that he might present them to us.

Nowadays Coban does not deserve the fame as a collecting center that it possessed when Griscom's book was written. Pine-covered ridges and luxuriant vegetation abound, but a few miles away the ever-increasing Indian population has destroyed the forests completely. Cornfields, an occasional coffee plantation and uniform second growth about one to three years old are everywhere. Birds around settlements are rare or nonexistent, for every boy and many adults carry slingshots. Country stores stock only the barest essentials of food, clothing and tools, but they all provide strips of synthetic rubber suitable for these murderous catapults. Nobody cares about the results.

The first three weeks in Coban were spent knitting and assembling pocket nets and making cages. I tried to get outside help to speed things up, but slowly we came to realize that the Indians who make up the greater part of Guatemala's population of three and a half million are entirely devoid of ambition for a better life. A little corn land, a few scraggly domestic animals, are all they have and want. Probably they are happy and carefree, even though they don't show it. Certainly they are independent; the few who, after weeks of waiting, do show up to work, will not stay long and leave on the slightest provocation.

Collecting around Coban turned out to be almost impossible on account of constant rain or



In tangled, matted jungle such as this the Society's bird collector is accustomed to set his pocket nets—and what is more, to catch birds in them! Some of the difficulties of hoisting and manipulating fragile nets in such surroundings are recounted by Mr. Cordier in this article. It is most important, of course, to know the habits of the birds, especially where to set the nets.

heavy, dripping fogs which transformed the otherwise practically invisible pocket nets into solid, glittering sheets of water. Without much regret I abandoned Coban for the mahogany country to the north, but twelve days of rain and misery produced only five unimportant birds.

The beginning of December was at hand and I had practically nothing to show for weeks of work. Obviously I must find some other and more arid section. It so happened that my friend Mr. Juan Schwendener, former Swiss Consul and owner of a large hardware store, who had been most helpful during our entire stay in Guatemala, had a brother who owned two farms under the slopes of the Sierra de las Minas. Mr. Schwendener urged me to visit that area, so I assembled my gear once more and two days prior to my departure sent a telegram announcing my imminent arrival.

All was in order; I had found a wonderful native helper who possessed initiative and a desire to earn money by working. He dashed hither and yon, removing my gear to the bus station, paying the freight in advance, buying the tickets, stowing everything neatly. I allowed him to retain some money as an advance on wages.

At 4:30 o'clock the next morning I boarded the bus, but my helper did not show up. What I had taken for bustling efficiency must have been convulsions, the last gasps of his energy. I never saw him again. However, the awkwardness of my lacking ticket and bill of lading was amicably settled with the driver, and for two hours the bus labored over a narrow, winding road traversing two mountain ranges. It was not comfortable bouncing and jolting on a board seat with my knees pressed hard against another board in front, pinned between my fellow travellers, five in a row. But finally the drizzle thinned and the sun shone; the mud gave way to two inches of dust. I was out of the rains at last, and certainly glad when the dust-covered bus screeched to a stop at noon near two houses, best described as oblong pens made of sticks lashed together on cross pieces, with one opening serving as door and window, all topped off with a low tile roof. This was my destination.

I made inquiries about my host's *finca* (plantation). Yes, it was not far, but he happened to be at his other farm in the mountains, six hours

away by horseback. My telegram? Oh, it was still there, and would be taken to the plantation next time someone happened to be going that way.

Being in a hurry to start collecting, I decided not to push on to the Schwendener *finca*. I received permission to stow my gear under a roof and proceeded to survey this arid section, a wide valley with stunted, shrivelled vegetation cutting into the slopes of the Sierra de las Minas, at the same time making inquiries about the bird that was uppermost in my mind: the Elegant Trogon, *Trogon elegans elegans*. In early skin collections this bird was thought to come from Guatemala, later its occurrence there was doubted, but after forty years new material definitely established it as a resident species in the upper reaches of the Motagua River valley. "Aurora" — the dawn — is the poetic name given to Trogons all over Guatemala.

"Oh, yes, we have Auroras," I was told, "if you are willing to spend fifty cents to see one. It will not take long; as a matter of fact, the low tree over there with the thick foliage should harbor some."

"Imagine," said the wife of the native who was talking to me, "the other night one got in the kitchen and nearly landed on my head! It sure scared me."

My description of the bird I wanted had not registered at all! I had described a bird with a long tail, green back and breast, a broad lateral white stripe on the lower breast, a scarlet abdomen — in short, a beautiful bird. The native and his wife were telling me about the Pigmy Owl.

"Would any of you gentlemen care to act as guide in search of the bird I am talking about — not the one you mean — in return for seventy cents a day, twice as much as you are earning for digging ditches or for chores in the field?" I asked. "Furthermore, I would pay fifty cents for every bird we see."

"Yes!" was the enthusiastic reply. "But tomorrow we are busy, and the day after we have to drive with a load of wood to the next settlement. Some time next week we will be glad to help you."

I walked away from these arid valley dwellers, doubting my ability to put an idea across to them, questioning the existence of the bird itself, of



And these are the Elegant Trogons, female (left) and male! The photograph was not made in the jungle (on his present trip to Costa Rica Mr. Cordier is carrying a camera, and we hope to have a pictorial account of his adventures later), but in the jungle-planted home of the Trogons in the Bird House at the Zoological Park, where they seem to be thoroughly settled.

my ability ever to get hold of a good bird in Guatemala.

That evening a boy of about nine came to admire my folding cot. He mentioned casually that a woman, Corona Morales, in the lower part of the valley, was catching birds. I had never encountered a woman colleague, but my motto in the field is: Never pass up a lead. So after many inquiries I found the house, a rather prosperous-looking one. Two men were leaving as I approached.

"Is this where Dona Corona lives, the lady who catches birds?" I asked.

"Now, what is this business of bird-catching I am supposed to know about?" a belligerent female voice demanded from inside the house.

I hurried away, calling apologies over my shoulder. Later I learned that Dona Corona had quite a local reputation for black magic and the boy who told me about her had heard an enthusiastic follower claiming that her supernatural powers were so great she could charm birds right out of the air.

IN THE EARLY hours of the sixth day I was scouting alone on the river banks far down in the valley. The trail, shaded by giant trees, ended at the river's edge. To go further meant taking off shoes and wading the river. So far I had seen nothing and was on the verge of giving up my useless quest for good when, fifty yards up the river, something green and scarlet plopped onto the surface of the river. A pair of wings beat the water two, three, times. Then a bird arose and disappeared among the overhanging branches. Twice more it plunged to the water from a distance of seven to ten feet. I was thrilled; this was it; this was the Elegant Trogon taking his morning bath! Who would have thought that it would bathe in this unorthodox manner, something to be expected of an aquatic bird but never of a Trogon? It was just the kind of a sight I needed to make me redouble my search, and wading upstream I came upon a female Trogon, so different from the male that I could hardly place her.

That same day, at a spot along the river where a dry bed branched off, I chanced upon a Pheasant Cuckoo, an arboreal roadrunner, so to speak, leisurely inspecting clumps of bushes. In his

quest for insects he came almost down on the ground — an unheard-of thing, as these birds usually live in the treetops. I had hardly taken in this rare sight when I noticed a Brown-headed Motmot. Investigating further, I came upon a farmhouse built of adobe bricks, and not far away another stick-and-mud house also under a tile roof. Beside them was a small *ajote* tree, a tree conspicuous for its shiny, smooth bark which peels off in paper-thin layers. The crown was devoid of leaves but studded with millions of fruits the size and form of capers, and feasting upon this fruit were five Tityras, silvery white and black birds belonging to the Cotinga family. When I walked up to them they hardly noticed me but kept on busily feeding. This was a novel thing, too, for the *ajote* grows to tremendous heights in the forest and feeding birds are always very high; here they were within reach.

I came instantly to a decision; this was going to be my collecting camp. It did not take long to come to an understanding with the owner of the house. For fifty cents a day his wife would feed me well, and for seventy cents additional he would throw in the services of his youngster — or he might even work himself.

Don Jesus, the owner, assured me that he was known far and wide as an upright and hardworking man who minded his own business. It was regrettable that he had as a neighbor a low heel who was waging a continuous smear campaign and trying to do him dirt at every turn. He, Don Jesus, would be glad to let me hunt and cut down trees on his land whenever I took a fancy, but he warned me his neighbor would never consent to such liberties.

When Don Jesus was out of sight, I paid a visit to the neighbor, explained what I intended to do, loudly regretting my decision to put up at Don Jesus's house — a lazy man, speaking badly of everyone. It would, I said, be wise for me to move to *this* abode, but that against my better judgment I would stay with Don Jesus, being tired of forever moving.

My shameless duplicity was successful; presently I was informed that I was welcome to hunt wherever I pleased. Now (after three more days spent in getting part of the bamboo poles I needed for putting up my nets) I was ready to get down to the business of collecting.

On the third day after my arrival I met with three Elegant Trogons, perched motionless, seemingly not looking at anything. With a sudden short flight and a swoop they would gather a berry or an insect and be gone like an apparition. A bush on the river's bank, not more than seven feet above water, was the obvious focus of their interest, and the place to put up nets.

Putting up the nets took all day. When I pointed to the trunk of a tree, saying how suitable it would be for attaching one net, there would be no helpful comment from Don Jesus.

"Now, Don Jesus, I am afraid you will have to gather your old bones and shinny up the tree, eh?"

"Well, I am an old man, already a useless husk at forty-five, full of pains, but I am a truthful man and know my obligations. Here we go."

His initial alacrity diminished rapidly, but an hour before nightfall we had hung all the big nets I had on hand, and it was time to take them down again for the night — a matter of lowering them on the lines through pulleys that were left in place, and of rolling them into bundles. At daybreak the next morning it was simply a matter of hoisting, requiring only an hour of swift work since no sudden gust of wind entangled the net. Things had gone well; our Trogon was calling nearby, and expectantly we faded into the underbrush.

Almost immediately there was an audible smack in the net on the opposite bank and we popped out of hiding. Our prey hung motionless a moment, then started to flap its wings violently, and a shower of gray feathers floated down. A dove. The symbol of peace. As we waded nearer we could see a male Trogon studying the spectacle presented by that infernal dove. Not only was *that* Trogon never going to fall into one of these nets, but he would stay away from that spot altogether and his reluctance would be communicated to the others.

Extricating the dove, picking out the clinging feathers and restoring the net to position took an hour, plus three more for repairing the big hole its struggles had torn in the mesh. There was still a little time before the sun rose high to warm the valley floor and the gusty wind made working with nets impossible, and in that time a Brown-headed Motmot was entrapped.

With the Motmot in a collapsible cage I went

exploring along the river bank, taking the bird along to feed it every hour. A great many Brown Thrushes flying in and out of an enormous ficus tree caught my attention; then I noticed several Toucanets feeding among the tiny ripe figs among the upper branches. A pair of Brown-headed Motmots were working near the ground. A Trogon would nicely complete the picture . . . sure enough, there was one — two — three — actually five of them!

I stayed in the same spot for hours, watching the Trogons feed in complete silence and in the most haphazard way. The five or six tiny figs that will satisfy their hunger for half an hour are picked on the wing with unerring swiftness, from widely scattered points on the tree. Becoming bored with monotonous fare, they would dash off and vary their diet with tree-dwelling insects. Well before dark they faded away, no doubt to roost, for I saw them for a time in the bushes on the opposite bank.

The following night I examined the roosting place with a flashlight and came upon one Trogon asleep a few feet above the water. Directly below the perch there were no obstructing twigs, so that the bird might attain its perch without sound and dash off to safety in case of a disturbance during the night. In this the Trogon shows a remarkable likeness to the habits of the Guatemalan Quetzal.

THE NEXT DAY I busied myself making a contraption consisting of two cotton bags three feet long, their opening sewed to wire rims about eight inches in diameter, both bags mounted on a stick with the rims facing each other and about five inches apart. The idea was to shove these two bags upward against the sleeping bird, whereupon it was supposed to fall into one of the bags.

On my first night's hunting with the bags I acquired company. Beyond the river bank three natives were hacking a hole in the side of an elevated irrigation ditch, draining a mile-long stretch of precious water in order to pick up stranded fish. At that place and time of night, mutual explanations of our activities were in order and mine, that I was "fishing for birds," did not bear clear marks of authenticity. The trio decided to accompany me and see for themselves.

Finally my flashlight revealed a Turquoise-

browed Motmot which I bagged with professional skill, to the amazement of the natives. At one o'clock in the morning we parted company and I faced a two-mile return trip over a rock-strewn river bed with one, single bird, the Motmot; it was my seventeenth day of the quest for the Elegant Trogon, and my spirits were as dark as the night.

Suddenly I was electrified by a gleam of scarlet in the foliage ahead — a male Trogon perched in a mango sapling only six feet above ground. I put out the light and backed away to ready my gear and to recover from buck fever. After all my collecting experience, I must confess that my heart was pounding as I approached the sleeping bird! Then, four feet away, my foot dislocated a pebble and the Trogon, practically in the bag, rushed off with a whirring of wings.

I was very sorry for myself.

Still, there was a female Trogon in the bush, still asleep; I walked up and bagged it, just like that, without emotion. I was too discouraged to care any longer, and with gear and bags stowed away I started home. After a few paces I was assailed by doubts. Could there be another male Trogon nearby? I searched with the light, found another male eight feet above the water, and bagged him without the loss of a feather!

That was the turning point. It would be tedious to recount how other Trogons, orioles, woodpeckers, Tityras and Motmots came in one after another, how I stabbed my leg on the stump of a sapling and was bothered by the wound for two months, how a Pigmy Owl blundered into a net left up overnight by my helper, despite orders; and how, while extricating the bird the next morning it nipped Don Jesus's finger and he promptly killed it to teach it better manners.

Gradually, through observations of my own and reports of my helpers, the behavior pattern of the Elegant Trogon began to take form in my mind. One group of birds lives in the gallery forest, never getting far away from water and regularly perching above or only a few yards away from it. The other group takes to the dry gullies and canyons, but when the light begins to wane the birds come down to roost in the leafy trees at the bottom of the canyon. Of the gallery forest birds I was able to get a few specimens; of the latter, none, since they were always

perched in such a manner that a soundless approach was impossible. One evening I came upon a male feeding repeatedly on a lilac-colored flower growing on a leafless tree. The natives, incidentally, also enjoy these flowers in the form of a salad. As the weeks went by and the heat and dryness increased, resulting in the shedding of leaves by most of the trees away from water, the number of Trogons coming to the roosts at night was noticeably greater.

TOWARD THE END of December all my cages were filled and I arranged for transportation truck to Coban. The day before my departure — on Christmas Eve it was — an incident occurred that brought home to me once more how one is always flirting with disaster when collecting birds. Don Jesus had gone to the village; he came home with, as the expression is, a snoot-full. His fighting spirit was up and he began shouting insults at his neighbor and mortal enemy.

Inevitably the neighbor showed up, armed with his longest machete, and when it dawned on Don Jesus that he had stirred up a hornet's nest, he darted inside his own house and came out with a shotgun. Of course, womenfolks on both sides were tugging and squalling and trying to separate the warriors. At first I was an amused onlooker, but then it came to me that very likely someone was going to get killed, and as a witness I would have to appear in the far-away capital — which would mean the absolute loss of this part of my collection. So I summoned a desperate bravado, stepped between the men, called them all kinds of fools for quarreling, the one for picking a fight while drunk and the other for taking a drunken man seriously, and finally sent them off in different directions.

But just as like as not, that incident could have wrecked my whole collection.

I do not like to think about the trip back to Coban by truck. We ran — jolted, rather — the journey by night, with the truck loaded with rock salt to relax the springs. Sometime during the night we halted. There was an abyss before us where the road, for a hundred yards, had tumbled into the river.

I had no spare food for my birds for such a delaying emergency as this. Moreover, my purse

had run dry and I had only thirty cents.

At dawn I found a native hut far off the road, with six young chickens scratching in the yard. By good luck the Indian could speak Spanish, and I explained I wanted to buy a chicken at his own price. There was a grunt and a long, long silence, then —

"These chickens are not mine; they belong to the patron and can't be sold."

"Hombre," I said, "this is no obstacle. Tell your patron one chicken died."

My man was slow on the uptake, but not incorruptible, and presently I paid my last 30 cents for a chicken worth 10 cents and raced away to the stalled truck, decapitating and plucking the

fowl as I ran. The flesh, cut apart as best I might, made one feeding around. Eventually a car approached the caved-in road on the opposite side, I persuaded the driver to turn around and head for Coban, and the birds were carried across the chasm and loaded in the providential vehicle. Everything must end; so, eventually, we reached Coban.

That same evening I put all my nets out, expecting to stay a few days more. I had just stretched out on my cot, feeling I had earned a rest, when a messenger came from my wife telling me the boat for America was to leave the next morning!

I do not know how, but somehow I made it.

Birds Received from the Guatemalan Expedition,

March 15, 1947

Star (*) indicates first time exhibited
at the New York Zoological Park.

SPECIMENS	COMMON NAME	SCIENTIFIC NAME
*2	White-bellied Wood Rails	<i>Aramides cajanea albiventris</i> Lawrence
1	Globose Curassow	<i>Crax rubra rubra</i> Linnaeus
2	Band-tailed Pigeons	<i>Columba fasciata fasciata</i> Say
1	Cinereous Dove	<i>Claravis pretiosa</i> (Ferrari-Perez)
1	White-winged Dove	<i>Zenaida asiatica asiatica</i> (Linnaeus)
*1	Lesser Road Runner	<i>Geococcyx velox pallidus</i> Carriker & DeSchaunsee
3	Short-billed Toucans	<i>Rhamphastos sulphuratus brevicarinatus</i> Gould
*1	Gray-headed Pigmy Owl	<i>Glaucidium minutissimum griseiceps</i> Sharpe
*4	Chestnut-headed Motmots	<i>Momotus mexicanus castaneiceps</i> Gould
*1	Van Rossem's Turquoise-browed Motmot	<i>Eumomota superciliosa vanrossemi</i> Griscom
*8	Elegant Trogons	<i>Trogon elegans elegans</i> Gould
*3	Massena Trogons	<i>Trogon massena massena</i> Gould
*2	Northern Violet Trogons	<i>Trogon violaceus braccatus</i> (Cabanis & Heine)
*3	Santa Cruz Woodpeckers	<i>Centurus aurifrons santacruzii</i> Bonaparte
*1	Cabot's Woodpecker	<i>Veniliornis oleaginus sanguinolentus</i> (Sclater)
*1	Northern Thin-billed Woodhewer	<i>Lepidocolaptes souleyetii insignis</i> (Nelson)
5	Fork-tailed Flycatchers	<i>Muscivora tyrannus</i> (Linnaeus)
*5	Mexican Tityras	<i>Tityra semifasciata personata</i> Jardine & Selby
*2	Guatemalan Cactus Wrens	<i>Heleodytes capistratus xerophilus</i> Griscom
*1	Guatemalan Blue Solitaire	<i>Myadestes unicolor veraepacis</i> Griscom
*2	Guatemalan Brown Solitaires	<i>Myadestes obscurus oberholseri</i> Dickey & VanRossem
*2	White-breasted Blue Mocking-Thrushes	<i>Melanotis hypoleucus</i> Hartlaub
*3	Rufous-collared Thrushes	<i>Turdus rufitorques</i> Hartlaub
1	Guatemalan Black Robin	<i>Turdus infuscatus</i> (Lafresnaye)
2	Oven birds	<i>Seiurus aurocapillus</i> (Linnaeus)
2	Painted Buntings	<i>Passerina ciris ciris</i> (Linnaeus)
2	Indigo Buntings	<i>Passerina cyanea</i> (Linnaeus)
1	Black Seedeater	<i>Sporophila corvina</i> (Sclater)
*3	Crimson-collared Tanagers	<i>Phlogothraupis sanguinolenta sanguinolenta</i> (Lesson)
*1	Gould's Euphonia	<i>Tanagra gouldi gouldi</i> (Sclater)
*8	Mexican Green Tanagers	<i>Chlorophonia occipitalis occipitalis</i> (DuBus)
5	Passerini's Silver-beaked Tanagers	<i>Ramphocoelus passerinii passerinii</i> Bonaparte
*1	Gray-headed Tanager	<i>Eucometis penicillata spodocephala</i> (Bonaparte)
*1	Belize Red Tanager	<i>Piranga flava figlina</i> (Salvin & Godwin)
*3	Tabasco Ant Tanagers	<i>Habia gutturalis littoralis</i> (Nelson)
*10	Guatemalan Orioles	<i>Icterus gularis gigas</i> Griscom
2	Great-tailed Grackles	<i>Cassidix mexicanus mexicanus</i> (Gmelin)
*1	Costa Rican Magpie-Jay	<i>Calocitta formosa pompata</i> Bangs
*5	Ridgway's Jays	<i>Cyanocitta stelleri ridgwayi</i> Miller & Griscom

- *2 Guatemalan Sugar-birds
- *2 Guatemalan Juncos
- *17 Guatemalan Crested Quail
- *3 Guatemalan Green Sugar-birds
- *1 Guatemalan Silky Flycatcher
- *6 Cande's Manakins
- 1 Golden-masked Calliste
- *2 Garnet-throated Hummingbirds
- *1 Green-throated Cazique
- *3 Guatemalan Caziques
- *8 Green-headed Hummingbirds
- *11 White-eared Hummingbirds
- *1 Guatemalan Broad-tailed Hummingbird
- *1 White-bellied Emerald
- *1 Cinnamomeus Hummingbird
- *3 Mexican Violet-ears
- *2 Guatemalan Hermits
- *1 Dusky Hermit

- Diglossa baritula montana* Dearborn
- Junco phaeonotus alticola* Salvin
- Colinus leucopogon incanus* Friedmann
- Chlorophanes spiza guatemalensis* Sclater
- Ptilogonys cinereus molybdophanes* Ridgway
- Manacus candei* (Parzudaki)
- Calospiza nigro-cincta larvata* (DuBus)
- Lamprolaima rhami rhami* (Lesson)
- Lampornis viridi-pallens viridi-pallens* (Bourcier & Mulsant)
- Lampornis amethystinus salvini* (Ridgway)
- Eugenes fulgens viridiceps* Boucard
- Hylocharis leucotis leucotis* (Vieillot)
- Selasphorus platycercus guatemalae* Griscom
- Amazilia candida candida* (Bourcier & Mulsant)
- Amazilia rutila rutila* (DeLattre)
- Colibri thalassinus thalassinus* (Swainson)
- Phaethornis superciliosus longirostris* (DeLattre)
- Phaethornis longuemareus saturatus* Ridgway

Three Male Umbrella Birds for the Zoo

AFTER DELIVERING his magnificent collection of Guatemalan birds to the Zoological Park, Charles Cordier hastened back to the tropics to capture specimens of the male Umbrella Bird (*Cephalopterus ornatus glabricollis*). Letters dated in early May from "Umbrella Bird Camp" in the interior of Costa Rica report that almost immediately he captured three fine males, and also that he has acquired a male Quetzal. The

latter he bought from a native at a country store.

We were anxious to obtain male Umbrella Birds because we recently lost the surviving male of three birds which Mr. Cordier brought us on October 9, 1942, and at present have only a female—a much less spectacular bird.

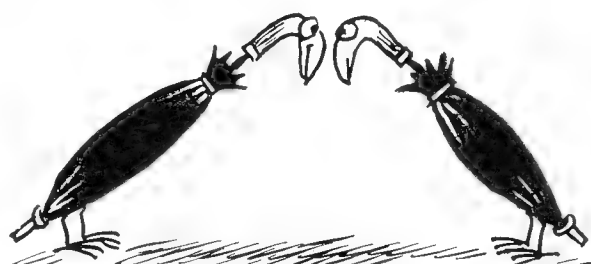
Mr. Cordier expects to return to New York before the end of the summer, and plans are being made now to send him out again.

STRANGE BIRD

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By Dahl

THE "UMBRELLA BIRD" AT THE BRONX ZOO WILL SOON HAVE A NEW MATE. A SPECIMEN IS BEING SENT FROM COSTA RICA. (NEWS ITEM)



THE UMBRELLA BIRD IS ONE OF OUR ODDEST FOWL.

THE UMBRELLA BIRD IS KNOWN TO MIGRATE EVERY FEW WEEKS AND FREQUENTLY GETS LOST.



IF IT WERE CROSSED WITH A HOMING PIGEON IT MIGHT FLY HOME WHEN ANYONE BORROWED IT.

IT'S ALWAYS OPEN SEASON ON THESE CREATURES AND THE GOVERNMENT PROVIDES NO SANCTUARIES FOR THEM.



THE UMBRELLA BIRD IS A NATIVE OF COSTA RICA AND WE SUPPOSE OURS HAS GONE BACK THERE.

THE "TIGHTLY ROLLED UMBRELLA BIRD" IS A BRITISH VARIANT ALTHOUGH IT THRIVES IN BOSTON AND PHILADELPHIA.



IT IS WELL BEHAVED AND SELDOM GOES ASTRAY.

IF CAUGHT YOUNG ENOUGH THE UMBRELLA BIRD CAN BE TRAINED TO EMIT A WARNING CRY ON RAINY DAYS.



EVERY WOMAN SHOULD HAVE ONE.

THE NEW ARRIVAL FROM COSTA RICA WILL SETTLE DOWN WITH ITS MATE AT THE BRONX ZOO.



IT IS HOPED IN TIME THAT THEY WILL HAVE SOME LITTLE PARASOLS.

5-12-47

DAHL

“The Pleasure of Your Society”

By DONALD T. CARLISLE

SO MANY PEOPLE have recently joined the New York Zoological Society that, as we round the half-year mark, we feel we should make some little recognition of our gratification in this fact. We are pleased with *your* society in *our* Society!

When, shortly before the close of the war, we began the attempt to interest people in our work, we felt sure that there were many who would wish to join us if they but knew more about us. Frankly, our potentiality for making new friends has surprised us. We are fast approaching the point where our annual membership will be *four times* what it was when we undertook this effort.

We have been very fortunate in having been able to live up to our promises. When we announced that we would have a herd of African Elephants they came through just as we predicted. The Père David's deer did not let us down. We must admit that there were some moments when we crossed our fingers about the Platypuses — but here they are, and far more exciting than we expected them to be. The new Giant Panda was the only animal who failed us — and through no fault of his own. But we are assured of his eventual successor, and, just as this is written, a ship leaves India with three of his little cousins, the Lesser Panda — a charming animal, of quite different appearance.

It is truly heartening to have been able to keep faith with our membership.

Ahead of us lie many more inspiring events. Some time, not too far off, we have every expectation of being able to open the Conservation Unit at the Park — a great practical teaching project on the subject of our natural resources that will include not only wild life of the region but demonstrations of the need for the conservation of soil, vegetation and water sources. It will be a pioneer force in the work of bringing conservation needs dramatically to city people who have the smallest contact with the subject. We hopefully anticipate the opening of an Invertebrate House — a building devoted to a wide range of all those most prolific animal forms that live their lives without a spinal cord. Our greatest, most important task is that of the new Aquarium. Today the plans for this magnificent structure have reached the point where we are studying tanks and valves and all the problems having to do with the placement of the more than two miles of pipe behind the scenes in this important institution.

We have plenty to do, plenty to think about in the work of living up to our overall promise — that of bringing the Society with the Park and the Aquarium to the point where we are indeed the world's greatest center of living natural history.

It may take a few years and it will certainly take many dollars to keep this promise, but with so many good friends to wish us Godspeed we feel sure that we can keep this pledge too.

New Members of the New York Zoological Society

Since the last issue of ANIMAL KINGDOM

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BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Now It's FOrdham 7-2090

The telephone number of the Zoological Park was changed on Sunday, June 1, to FOrdham 7-2090. Previously the number was RAYmond 9-2090.

Temporarily both the Fordham and the Raymond numbers may be used, but we suggest that our members who have occasion to call the Zoological Park correct their telephone lists and begin now to remember that we are "FOrdham 7" instead of "RAYmond 9." The exchanges and their numbers only have been changed; the remainder of the Park's telephone number is the same.

Summer Research Programs

Summer programs of research in the Zoological Park and at the Jackson Hole Wildlife Park in Wyoming were announced this spring by President Osborn.

Four qualified scientists will study deviate or abnormal behavior and adjustments of animals in the Zoo under grants-in-aid of \$500 each, and about a dozen field workers will be occupied from early June to the end of the summer at Jackson Hole on various problems of free-ranging animals, game management and conservation. Both programs will be coordinated by Prof. C. R. Carpenter of Pennsylvania State College.

It has long been obvious to the staff of the Society that magnificent opportunities for research in behavior exist in the Zoological Park. The field is so specialized, and so much time is required to make continuing studies, that it was decided to create special Research Fellowships. These studies will begin early in June, and will be made by men who hold at least one advanced degree in the broad fields of the zoological sciences, including medicine.

The field studies at Jackson Hole Wildlife Park will be conducted by men from various cooperating institutions and organizations, including the Wyoming Fish and Game Commission, the University of Wyoming the University of Wisconsin, the University of Michigan, Pennsylvania State College, Swarthmore College and the Zoological Society. Specific objectives of the program are surveys of the animal and plant life, studies of human factors in relationship to the research programs, and preparation of photographic and descriptive materials on the present status of the Wildlife Park.

President Osborn Testifies

The Zoological Society is watching closely the proposed state and federal legislation affecting conservation, and in mid-April President Osborn testified before the Public Lands Committee of the House of Representatives in Washington in opposition to pending legislation for the abolition of the Jackson Hole National Monument.

Mr. Osborn also addressed the New York Association of Teachers of Biological Sciences at the American Museum of Natural History in April on the work of the Society at the Zoological Park in research and conservation.

375 Pounds of Panda!

The regular monthly weighing of the Zoological Park's female Giant Panda on May 19 revealed that she now weighs 375 pounds. She weighed 57.4 pounds on arrival in December, 1941, increasing to 171 pounds at the end of 1942, 261 pounds at the end of 1943, 289 in December of 1944, 299 pounds in December of 1945 and 336 pounds last December. The Giant Panda's weight varies, up and down, from month to month, but the trend is still upward.

Important Australian Shipment

The most important shipment of Australian animals in several years (apart from the Duck-billed Platypuses, of course!) reached the Zoological Park early in May, by arrangement with the leading Australian zoological gardens. The animals were brought by steamer by Karl von Hoffmann, explorer and lecturer, and arrived in fine condition.

Included in the shipment were 2 Red Kangaroos, 2 Gray Kangaroos, 2 Wombats, 2 Tasmanian Devils, 2 Gray Phalangers, 2 Cereopsis Geese, 2 Wedge-tailed Eagles, 1 Kookaburra or Giant Kingfisher, 26 Long-tailed Grass Finches, 10 Black-faced Gouldian Finches, 2 Red-faced Gouldian Finches, 2 Banksian Black Cockatoos, 1 Red-bellied Black Snake, 1 Diamond Snake and 1 Tiger Snake.

The finches and cockatoos were the gift of Mr. E. J. Hallstrom of the Taronga Park Zoo.

Lymphosarcoma Studies

Hodgkin's disease, a cancer-like malady of the lymphatic system which is usually fatal in man, is allied to lymphosarcoma disease in fishes, and this latter disease has been under study for some time at the New York Aquarium. Dr. Ross F. Nigrelli, the Aquarium's pathologist, has just completed a paper analyzing its occurrence in two species of fishes. Previous to his work, only four or five instances of the disease were known among fishes.

Dr. Nigrelli is now conducting experiments on the transmission of lymphosarcoma disease.

Harry Keller Retires

After thirty-five years in the service of the Zoological Society, Harry Keller retired on pension on April 19. Mr. Keller joined the forces of the Facilities Department (then known as "Privileges") in 1912, and in the past four years had served as Park messenger, working out of the Administration Building.

A life-long resident of the Bronx, familiar with the site of the Zoological Park long before it became a Park, he was often consulted about early history, and called upon to identify ancient photographs and landmarks. Although approaching the age of 75, and plagued by minor ail-

ments, his determination to do a good and full day's work, as well as his unfailing cheerfulness, will make him sorely missed around the Zoological Park.

Death of J. Alden Loring

J. Alden Loring, animal collector and field agent for the Zoological Society in the early years of this century, and for a brief time in 1900 the Assistant Curator of Mammals at the Zoological Park, died suddenly at Owego, N. Y., on May 8. He was 76 years old.

Snake Collecting Trip

Brayton Eddy, Curator of Insects and Reptiles, and Staff Photographer Sam Dunton, made a two-weeks' collecting trip to South Carolina this spring and brought back 69 snakes, lizards and amphibians, as well as scores of photographs and colored motion picture film illustrating the technique of snake-collecting.

They also brought back 116 live insects of ten species, and two species of spiders—all intended for display or culture purposes. Part of the east end of the Reptile House is now devoted to culturing insects for exhibition later in the season.

* * *

Dr. Myron Gordon of the Aquarium staff has been invited to present a paper at the fourth international cancer research congress to be held in St. Louis under the auspices of the Union Internationale Contre le Cancer and the American Association for Cancer Research.

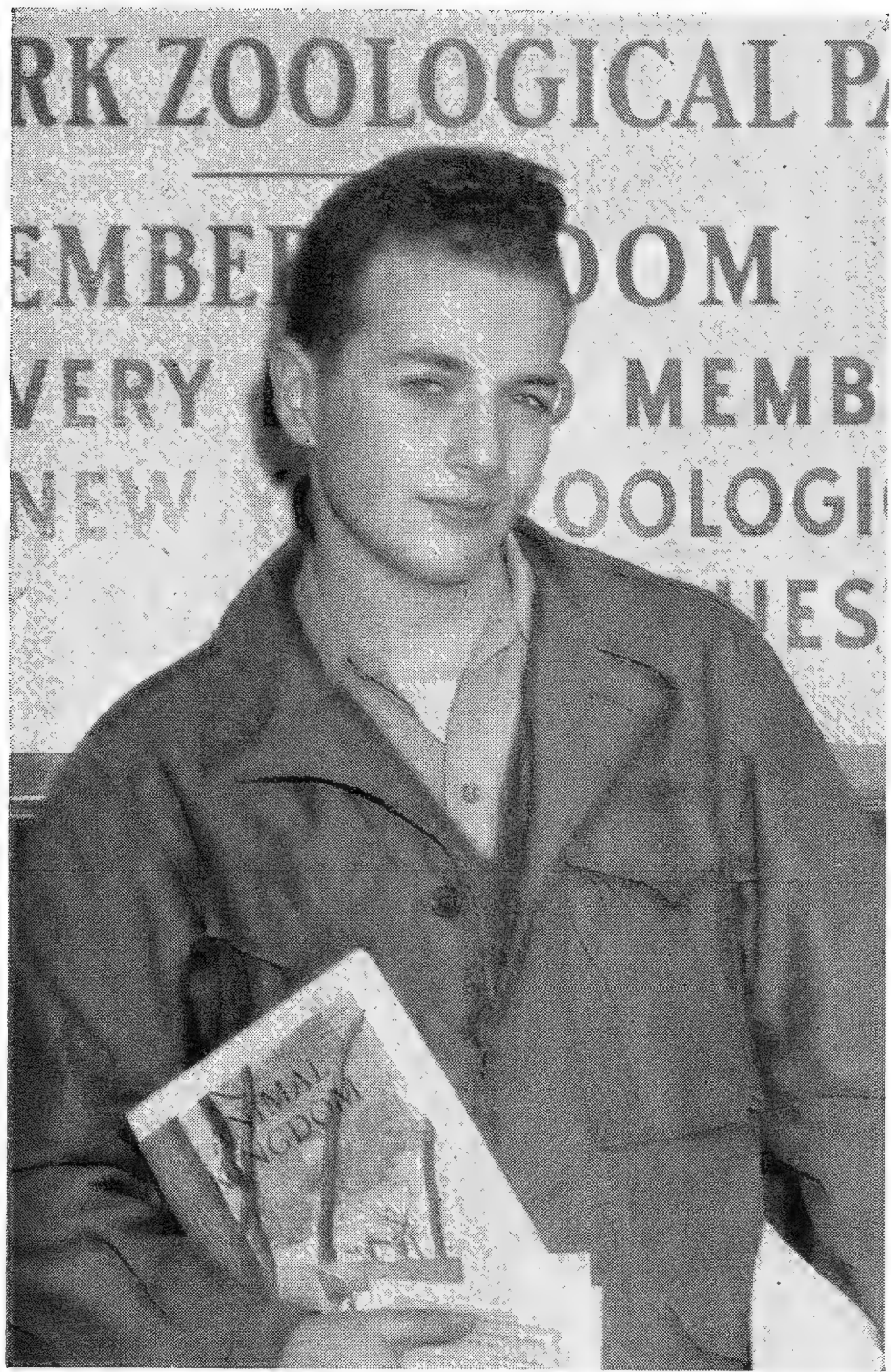
PUBLICATIONS OF INTEREST

WE BREED THE PLATYPUS. By David Fleay. Robertson & Mullens, Melbourne, 1944. 44 pp., 32 illus. 2 shillings and sixpence. (On sale in the Zoological Park at 60 cents).

THE PLATYPUS. By Charles Barrett. Robertson & Mullens, Melbourne, 1941. 62 pp., 29 illus. 2 shillings and sixpence.

THE PLATYPUS AND THE ECHIDNA. By William Bridges. New York Zoological Society, 1947. 12 pp., 8 illus. 15 cents.

The Duck-billed Platypus has been much in the news recently and a considerable interest in the life and habits of "the most wonderful of all living mammals" (as the late Dr. Hornaday called it) is only natural. It is one of the characteristics of the publishing business that when it senses a need, it hurries to meet it — and so we have three popular publications on the Platypus, designed to meet varying amounts of interest and varying pocketbooks.



100,000,000TH

At 12:55 P.M. on Friday, May 9, the hundred-millionth visitor to the New York Zoological Park since its opening on November 8, 1899, entered the Zoo at the Fordham Gate. He was Alan Schectman, 15 years old, of 1997 Hughes avenue, the Bronx. To commemorate the occasion, he was presented with a Life Membership in the Zoological Society.

David Fleay, the author of "We Breed the Platypus," is surely well-known to members of the Zoological Society as the man who brought Betty, Penelope and Cecil to these shores only a few weeks ago — and the author of the leading article in this issue of *ANIMAL KINGDOM*. His booklet, now on sale in the Zoological Park, is a wonderfully illustrated and graphically told account of Jack and Jill, his pet Platypuses in Australia, and the hatching of their baby Corrie in the winter of 1943-44 — the first baby Platypus hatched in captivity.

The story of Corrie has already been reported

in *ANIMAL KINGDOM*, in an article by Mr. Fleay in the issue of May-June, 1944, but his pamphlet account is somewhat more elaborate, and much more fully illustrated.

Charles Barrett, the author of "The Platypus," is a Corresponding Member of the Zoological Society and an occasional contributor to *ANIMAL KINGDOM* in past years. His booklet is more general than Mr. Fleay's, more concerned with the history of the Platypus, famous specimens of earlier years, and the natural history of the animal.

Both of these booklets we can recommend as the best available popular accounts.

"The Platypus and the Echidna," by the Zoological Park's Curator of Publications, is part of the Society's series of educational leaflets. It is a convenient summary of facts about the two egg-laying mammals of the world for those who do not prefer the more extended treatments of Mr. Fleay and Mr. Barrett.

NORTH AMERICAN GAME FISHES. By Francesca LaMonte. Doubleday, Doran & Co., New York, 1945. pp. xiv + 202, 172 illus. \$3.00.

Since there are well over three thousand distinct kinds of fishes in the fresh and salt waters of our continent, it would be an impossible task to describe all of them in one non-technical volume. What Miss LaMonte has done is select about 250 of these that are most commonly caught by anglers and provide simple means for their identification, together with data on their size, distribution and general habits. Some 150 also are illustrated, 81 in color.

This is the book for which fishermen have waited so long. Here is a pocket-sized, reasonably priced, well illustrated, accurately written yet non-technical account of the fishes they are most likely to encounter while fishing with rod and reel. Here is a book that will enable them to appreciate the diversity of common names under which a single species goes. By consulting the Tables of Record Rod-and-Reel Catches, each angler can compare his own "big 'un" with the authoritative record size and weight.

Fishermen are legion and Curators but a handful. Nevertheless, may two of the latter, inadvertent benefactors though they be, thank the author for a volume so handy and helpful in answering the multitude of questions put to



A Portfolio of 20 lithographs of animals by Miss Roberta Everett (many of them from subjects in the New York Zoological Park) has just been published by the Funk & Wagnalls Co. Most of the lithographs are of animals rarely seen in zoos—the Aard-wolf, Solenodon, Bongo, Okapi and the like. This plate shows Miss Everett's drawing of a South American Giant Anteater.

them concerning North American game fishes? Both in any fisherman's pocket and in our Question House, this book is indispensable.—C. W. C. & J. W. A.

HEREDITY, RACE, AND SOCIETY. By L. C. Dunn and Th. Dobzhansky. Penguin Books, Inc., (Pelican Books). New York, 1946. pp. 115. 25 cents.

The misuse of biological facts, principles, and theories by unscrupulous or sciolistic leaders of men is perhaps as old as Biology itself, but in today's most literate and articulate world of printing presses, radio, motion pictures and "popular" science, we have become alarmingly vulnerable to dangerous half-truths and lies masquerading as scientific verities. We have seen whole nations bloodily dedicate themselves to discredited biological theories, while at home Biology — warped almost beyond recognition or totally dismembered — helps sell nostrum and panacea, justify the *status quo* or the revolution, and prop up the schemes of all manner of crack-pot crusaders and seekers of special privilege. Paradoxically, we have become better informed to be more misled; the old saw about a little knowledge seems especially apt today.

No facts and theories have been more abused than those pertaining to the races of man and the origin of differences among men. Professors Dunn and Dobzhansky have written a small book that goes far in correcting numerous fallacies which seem to have become part of the common knowledge of our time and that presents in their stead a lucid, integrated account of our present-day knowledge of human heredity and its relation to our society. Such significant topics as the scientific basis for the uniqueness of each human being, the realities and ambiguities of human races, heredity vs. environment, social Darwinism and the limitations of negative eugenics are discussed in non-technical terms.

This book should be required reading for all those who take their citizenship seriously. The best protection for the social and economic equality of individuals and groups, say the authors, is "the will and knowledge of the people and it is a fundamental obligation of science to acquaint them with the biological facts necessary for understanding human likenesses and differences." This obligation has been most excellently fulfilled.—J. W. Arz.

There Must Be 100,000!

WE FEEL sure there are at least 100,000 people in this country who would be happy to support this Society by their membership if they but knew more about us. New members come in daily. In fact, in the first six months of this year we will have gained as many new friends as our total annual membership two years ago.

We like to think this is so because our work has such a strong appeal to nearly everyone. We are not just the administrators of a Zoo; not merely the planners of a great new Aquarium. Our work in Conservation will we hope be of significant help to all future peoples. Properly developed, our educational work we feel can go a long way towards offsetting the materialism of the day. Research growing out of the Zoo and the Aquarium can help in the solution of many human disease problems.

We still need more friends, however — more people who know these things about us. Many of our new friends come to us from our older ones. Please continue to send them to us.

Just mail in their names and addresses to:

MEMBERSHIP COMMITTEE,
New York Zoological Society,
630 Fifth Avenue,
New York 20, New York



ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

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VOL. L

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Phrases and Causes

ANY cause is, of course, aided immeasurably by the words that are used in expressing its purposes or its importance. Some phrases happen to catch the public fancy and even to arouse people to vigorous action, others just somehow miss the mark and are as well unsaid. How would England have come through her night of despair had it not been for Churchill's immortal message?

In its own sphere our institution is engaging itself more and more actively in a cause of growing urgency — that of conserving not only wild life but the other natural living resources upon which man as well as all animal life depend. In an issue of this publication early in the coming year, there will be rendered a report concerning the plans that are being made to bring our work in conservation to a level of the utmost possible effectiveness. We will hope that the Members of the Zoological Society will aid in every way they can, including "making the message," so that it will speak to all who read. Consequently, in the same forthcoming issue, there will be announced the terms of a contest in which our membership will be asked to join. Someone will best express the need in telling words.

Fairfield Osborn

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AUG 8 1947

A "New" Old Building—and New Animals

By LEE S. CRANDALL

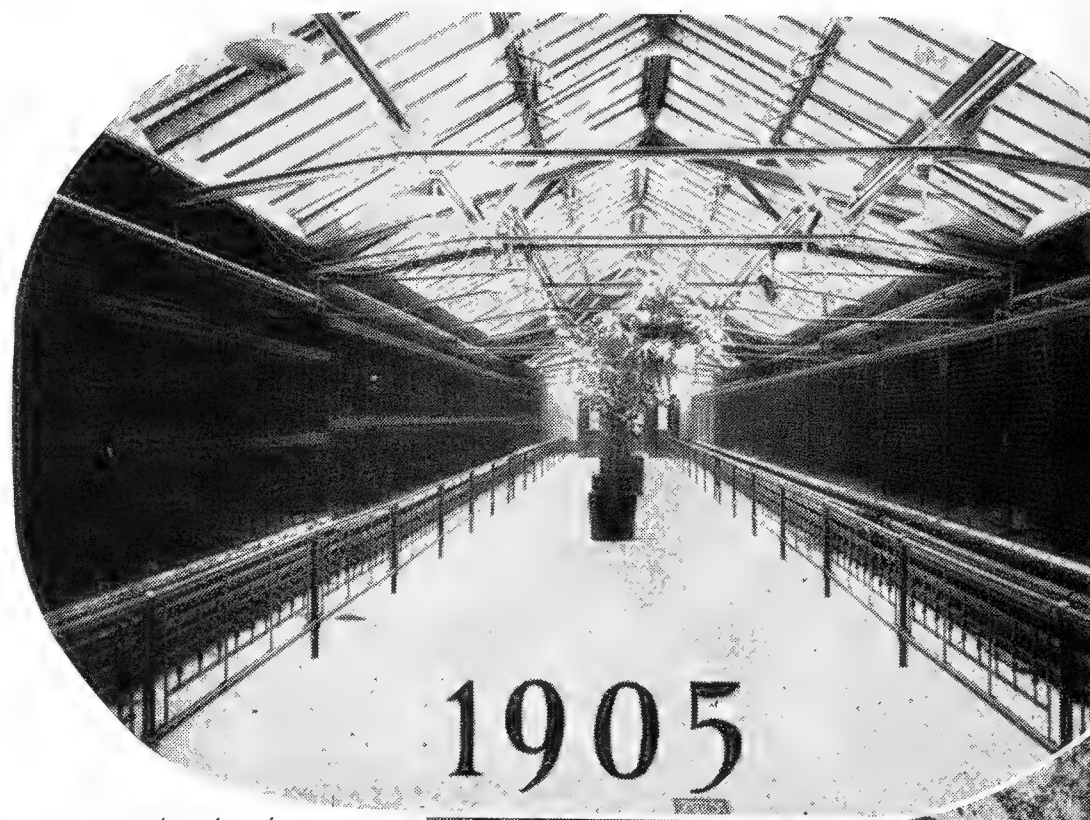
Forty years ago the Small Mammal House was considered the last word in modern construction, but times have been changing and now we know how to give the animals—and the visitors—a far better installation. Fortunately, just at the right time, some exciting new animals came to us, too. So here they are—building, animals, all new!

NOWADAYS, not many weeks pass without something new to test our absorptive qualities. Sometimes a long desired animal, sometimes a badly needed installation. In either case, quite new. The slow recovery from the dismal years has conditioned us, however lightly, to expect less than once we might. At first emergence, we were pleased with any small creature, the absence of which had left a void. Insignificant repairs, long needed, brought disproportionate delight.

But that was last year. Already, 1947 has brought us a building reconditioned to a beauty it never knew before. The first six months have seen the arrival of mammals, birds and reptiles of such rarity that, if we had seen them before at all, it was only at intervals in the long course of years.

On Members' Day, June 12, Jimmy the Kinkajou, ably assisted by President Osborn, cut the ribbon that crossed the entrance to the revitalized Small Mammal House. Even the most modest among us could not stifle a glow of pride for we felt — and still feel — that we had found a solution for a problem that has plagued zoological gardens from the beginning. For while many mammals in the more diminutive ranges of size are charming and attractive, too often their natural effluvia are offensive beyond reason.

The real success scored by the Jewel Room in the Bird House suggested the possibility that its principal might be applied to the Small Mammal House. Consequently, for more than a year, we were occupied with the installation of a hanging ceiling and solid



false fronts, which insured a darkened public space. Curved-backed cages, of varying sizes, were then set up and equipped with glass fronts, carefully designed decorations of rock work and branches, built-in water fountains, fluorescent lights and forced-draft ventilation. Carefully chosen animals are now seen under the best possible conditions — seen but not smelled!

An interesting development in the never-ending search for the perfect label, is seen in transparencies set above the cages and lighted from the same source. These labels are in three sections, one giving common name, technical name and distribution, another factual material, the third a photograph of the general habitat.

Few actually new specimens were acquired for our remodelled building, but most of those now shown there had been so long in seclusion that they had become strangers to our visitors. But other installations now house recent arrivals in great variety.

First among the mammals are the three Duck-billed Platypuses brought from Australia by David Fleay. Along with the Platypuses came a pair of Australian Echidnas, representatives of the second group of egg-laying mammals.

Marsupials are represented by Wombats, Tasmanian Devils, Phalangers and Kangaroos, brought from Australia by Captain Carl von
(Continued on Page 136)





LEFT—Visitors stand in semi-darkness to watch the small mammals in fluorescent-lighted cages.

BELOW—Golden Agoutis from the New World tropics are at home in their new compartment.



SERVAL
Felis serval SCHREBER
TROPICAL AND SOUTH AFRICA



HOMELAND OF THE SERVAL

AMONG the several smaller cats native to Africa, the Serval is easily recognized by the combination of spotted coat, long legs and large ears. The two horizontal black bands on the inner surface of each foreleg are also characteristic. Several forms have been named from sections of the range of the species.



ABOVE—This Colombian White-bellied Squirrel was found living at liberty in the Zoo trees.

RIGHT—Working space behind the cages is large and well-planned for easy operation by keepers.

ABOVE—A new type of label that is illuminated from behind proves most successful.





One of our most recent acquisitions is an affectionate baby Orang-utan, only about a year and a half old. Bright red hair—always frowsy—and an engaging series of facial expressions have won him friends all over the Zoological Park. At present the baby is in the Nursery.



The Lesser Panda from China is quite unlike its relative, the Giant Panda, in external appearance. Recently we received three of these animals through the efforts of Dr. Dillon Ripley.

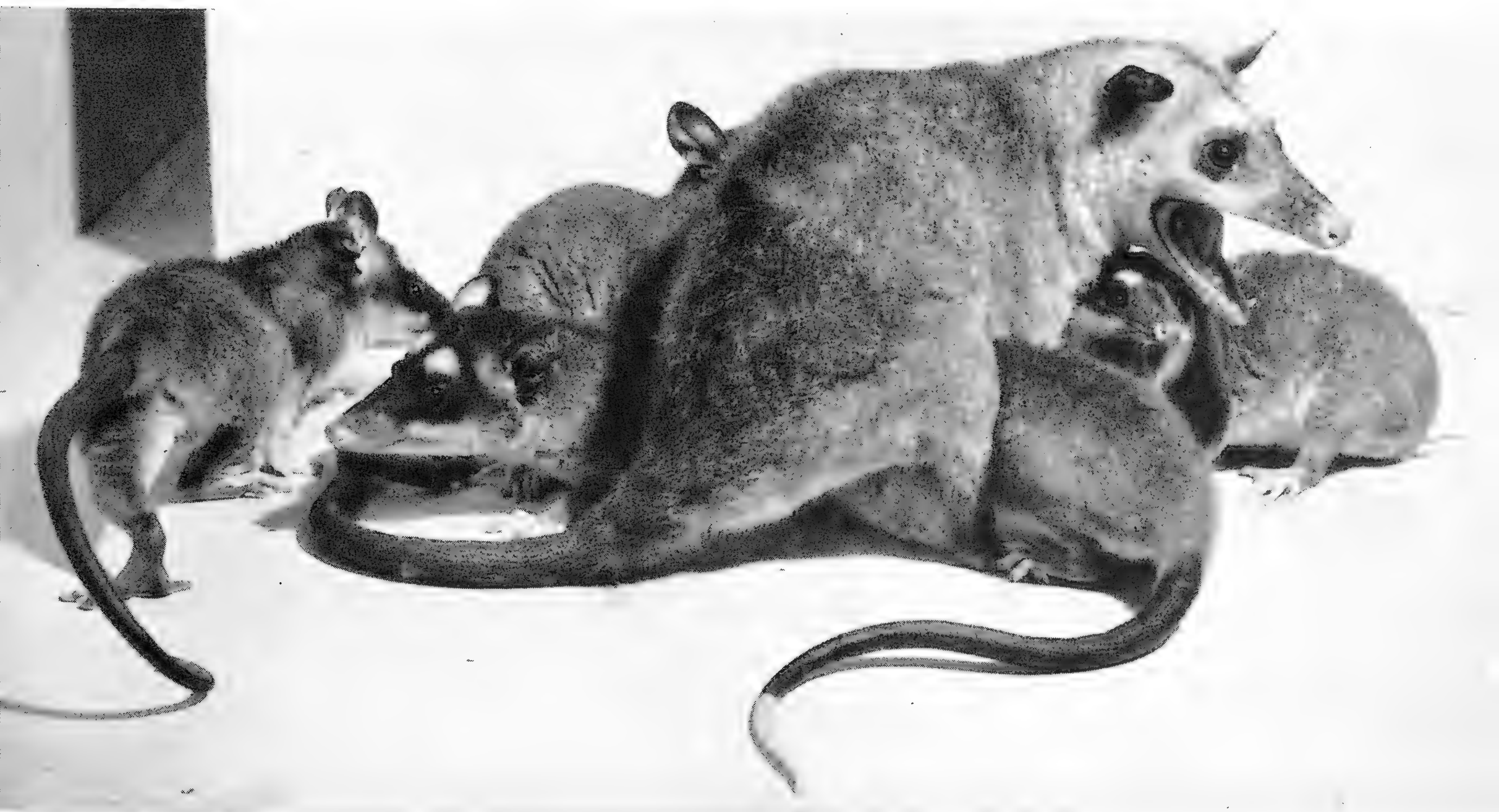
A baby Baird's Tapir—a rare animal—came to us by air from Panama. As the animal grows, it will lose the juvenile spots and streaks that help to camouflage it in its babyhood.

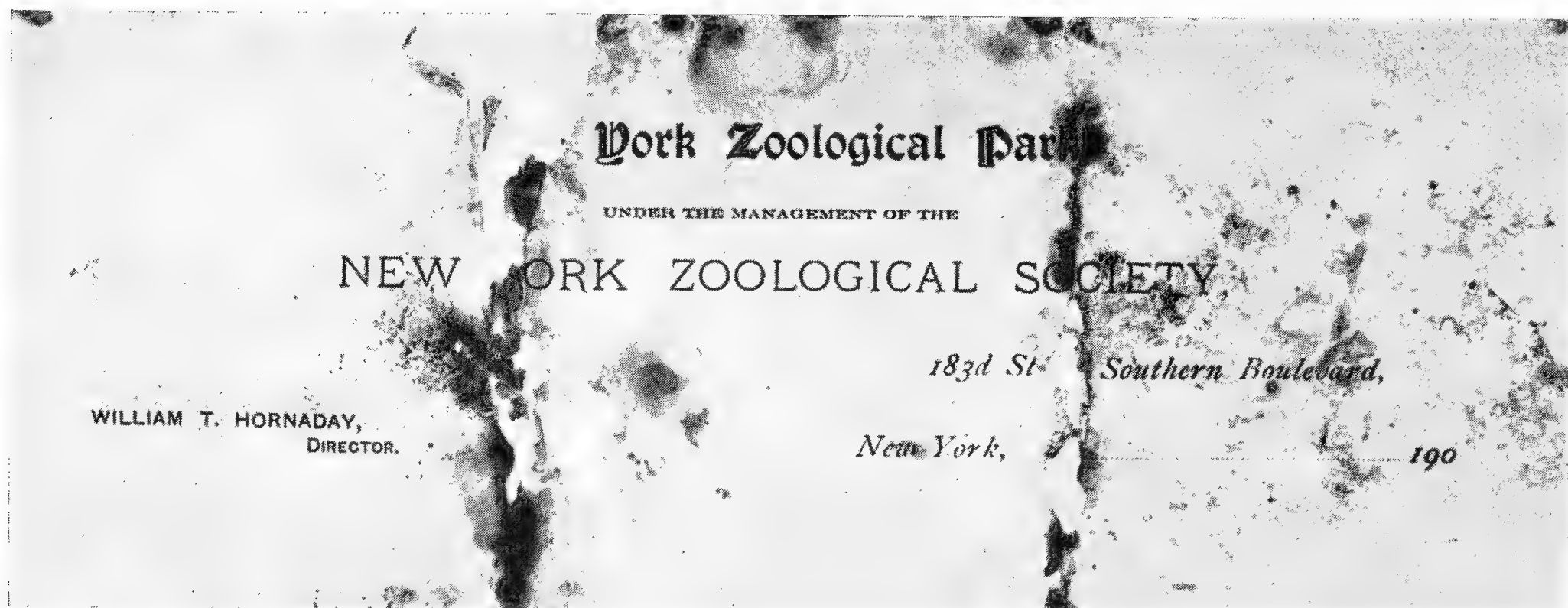




ABOVE, LEFT—A female Banksian Black Cockatoo from Australia. ABOVE, RIGHT—The male Banksian. This magnificent pair was a gift from E. J. Hallstrom of the Sydney Zoo.

A Brown Opossum was sent to us from Panama and enroute it produced a litter of five babies—and thus, quite unexpectedly, we have an interesting family group to put on exhibition.





Dr. Hornaday's record of the ascent of the Pinacate Mountains was written on an old-style letterhead of the Zoological Park. The record was still legible after the elapse of 40 years.

Following the Trail of Dr. Hornaday in Sonora

By DR. JAMES BONNER
California Institute of Technology

ANYONE WHO has read the vivid description of the trip made by Dr. William T. Hornaday into the wild and rugged Pinacate Mountains of Sonora, Mexico, in the year of 1907 for the purpose of collecting the mountain sheep of that region for the New York Zoological Society cannot but have had a desire himself to visit the region and to see for himself the desert so beautifully described in "Camp Fires on Desert and Lava." This book, a report of Dr. Hornaday's trip, has become a classic of desert travel literature. It tells of the journey made by the former director of the New York Zoological Society in the company of Dr. William T. McDougal, director of the Carnegie Desert Laboratory in Tucson, a journey made by wagon, horseback and afoot, into as wild and uncompromising a region of desert and desert mountain as can be found in the Southwest; a region of sandy washes, rugged lava flows, volcanic craters, and lofty mountains in which water is found only in hidden pools or tanks in the deep canyons or in the few wells dug by early prospectors.

The reading of Dr. Hornaday's book so aroused the interest of a group at the California Institute of Technology, that in March, 1947, almost forty

years after the original expedition, a party of five set out from Pasadena to revisit the Pinacate Mountains. Entrance into Sonora was made at the little border town of Sonoyta which looks today much as Dr. Hornaday described it; in fact one local resident, Nacho Quiral, clearly remembered the wagons of the Hornaday party passing through on their journey of exploration. By a judicious choice of old trails and wagon tracks it was possible to approach to within five or six miles of the east slope of the Pinacate Mountains. These tracks were barely passable to an automobile and the party had to spend almost seven hours digging the car out of one sandy wash. The circuitous approach to the west side of the mountain is now as it was forty years ago.

From a camp at the base of the Pinacate Mountains an ascent was made of Pinacate peak and of the lower peak, named Carnegie Peak by the New York Zoological Society party. Three fine rams of *Ovis canadensis* watched the ascent of the party up the higher slopes, just as they did for Dr. Hornaday. On the summit of the peak a small cairn was found containing a rusted tin can and in the can, on stationery of the New York Zoological Society, was the record deposited

by Dr. Hornaday, including the names of the party and information as to the sheep and antelope seen and collected. Dr. Hornaday's ascent is the first recorded ascent of this isolated peak. Two other later ascents, one in 1924 and one in 1927, are recorded on the back of the Hornaday record. The region is obviously still not overrun with visitors, a point which was emphasized by the fact that not one person was seen in the region during the three-day stay by the present party. Karl Lumholtz, the Norwegian ethnologist, visited the region in 1909 and has described

it interestingly in his "New Trails in Mexico." He did not, however, climb the peak.

The sheep and antelope have suffered severe reduction in numbers since 1907, owing perhaps to the continued hunting of these animals by residents of Sonoyta and other communities in Northern Sonora. The volcanic craters still hold the fascination that they did for the 1907 party, and the desert flora, in which the present party was mainly interested, is diverse and interesting. Dr. Hornaday's enthusiasm for the Pinacate is fully shared by ourselves, his latter day followers.

November 20, 1907.

For whom it may concern:

On this date, at 1.30 P.M., the following persons, under the leadership of Dr. Daniel Tremble MacDougal, Director of the Desert Botanical Laboratory at Tucson, climbed to the summit of this the highest peak of Pinacate Mountain, took observations and deposited this record.

Dr. D. T. MacDougal,
 Mr. John M. Phillips, of Pittsburgh, Pa.
 Dr. William T. Hornaday, of New York.
 Godfrey Sykes, with Dr. MacDougal.
 Mr. Jeff. Davis Milton, Immigration Inspector at Sonoyta.

The party has reached the summit from a camp due west, which was reached by pack trail from the north-west.

Mr. Sykes states that the elevation is 4660 feet.

Six mountain sheep and 2 antelope have been shot up to this date. Seventeen sheep watched our ascent from these high slopes on the west, one of which is known about to be shot by Dr. MacDougal.

Other members of the party, but not making the ascent are Frank Cole, Jess Johnson, and Ben C. and Charlie Foster.

W. J. L. Pender.

Dr. Hornaday wrote an account of the ascent on the sheet of Zoological Society notepaper and signed it as "Recorder" of the mountain-climbers.

WATER IS MUCH

By JAM

EVERY SCHOOLBOY knows that water is H_2O and every aquarium man wishes that were all it is. He is more likely to think of water as a fluid substance that is salty, muddy, hot, hard, brackish, clear, temperate, soft, fresh or cold, with an inconceivably great range of chemical impurity and an instability that sometimes drives him to distraction.

In the new New York Aquarium we are planning right now, there will be 1,250,000 gallons of this complex fluid commonly called water, and to handle it, separate it, channel it according to minutely different kinds, there will have to be forty major circulating systems and perhaps a hundred more systems-within-a-system.

Needless to say, the staff of the New York Aquarium is not wracking its brains over circulatory systems out of pure interest in water as such. The fishes are the cause of it all — fishes that will be gathered from ice-cold tarns, from hot volcanic springs, from fetid swamps and crystal pools, soda-charged waterholes and acid lakes in the pine barrens, silted rivers and sparkling mountain streams, sun-heated ponds and tidepools and cheerless caves.

Sooner or later they are all (we hope) coming to the New York Aquarium, and they *must* have the kind of home they are accustomed to. They must, or they die.

"Water is the lifeblood of the aquarium organism." That is the way the late Dr. Charles Haskins Townsend put it, and as director of the New York Aquarium for thirty-five years he knew what he was talking about.¹ But a big aquarium organism is more complex than a simple comparison with the human organism would imply; one circulatory system and one bloodstream do very well for us, but the new New York Aquarium will have 40 to 100 hearts (pumps), and a corresponding complexity of veins and arteries (pipes), kidneys (filters) and lungs (aerators).

Even if fishes do require many different kinds of water, why not simply give them a tankful of the kind they want and let them stay in it? Why complicate matters with pumps, filters and circulation? The necessity for all this apparatus is



MORE THAN H₂O

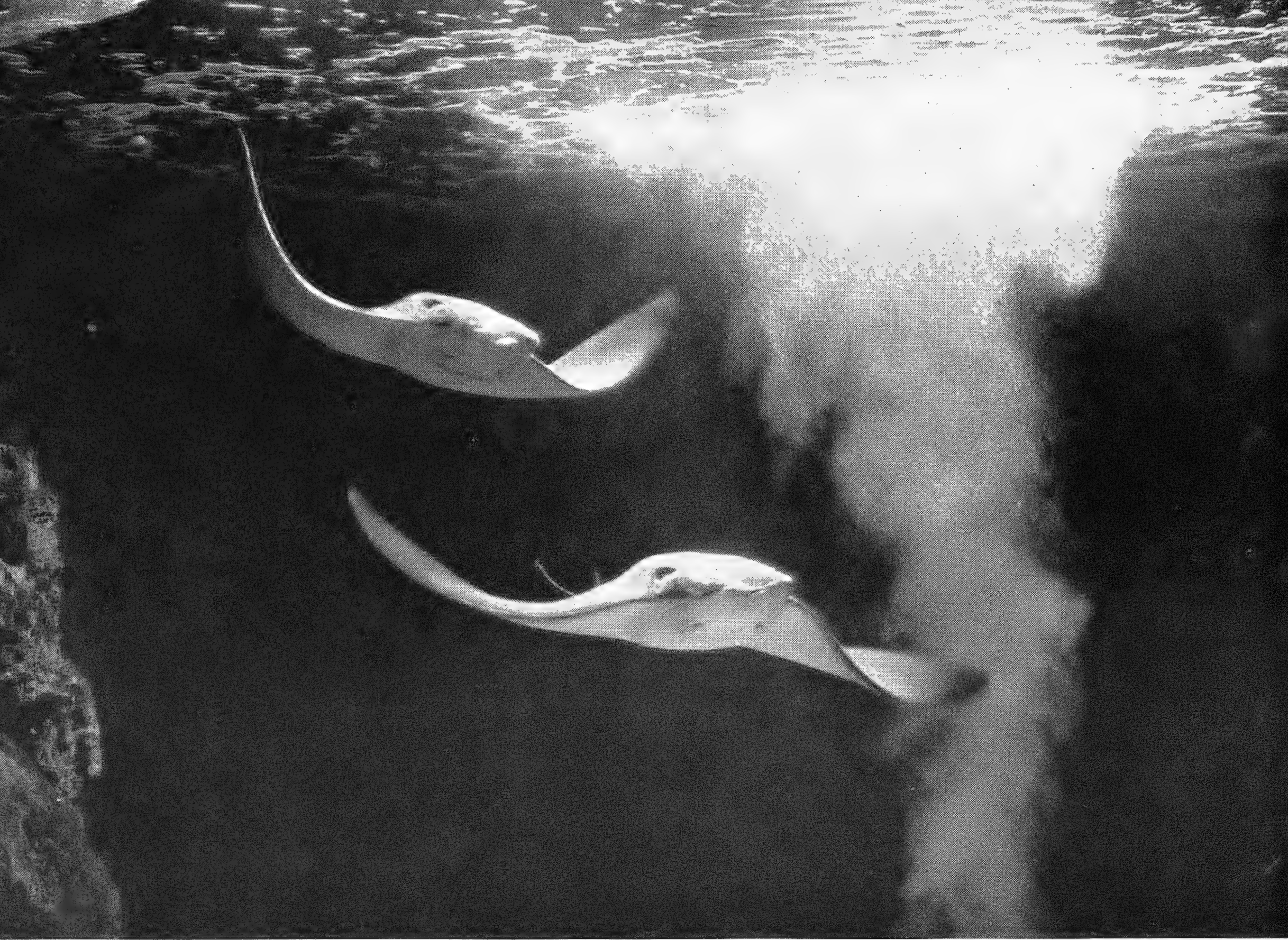
ATZ



that animals and plants, living in water, change that medium *by* living in it. Just as we foul the air we breathe and could not live in an unventilated place, so aquatic organisms produce carbon dioxide, which must be removed from their tank else they smother. Of course, there are also all the other waste products of digestion and metabolism to be considered. What filtering and aerating do is remove particles of uneaten food, excessive bacteria and deleterious gaseous and solid wastes, thus keeping the water clear and innoxious.

However, many of those waste products which are liquid or pass into solution are in general unaffected by filtration. Therefore these gradually accumulate, and while they may actually be beneficial to some species, they may eventually become harmful and so must be removed or neutralized. In small, fresh water systems with many plants in relation to the number of fishes, the vegetation may use up much of the animals' wastes in its growth, but in other fresh water ones, part of the water is periodically replaced with new, and so the concentration of waste products is lowered.

This problem of soluble wastes is somewhat different where sea water is concerned, and for many years was a stumbling-block to all aquariums not able to draw a continuous supply of clean sea water from the ocean. It was the New York Aquarium and, independently, the Plymouth Aquarium that finally solved this difficulty, instituting simple methods of chemical control of sea water that have become standard aquarium practice all over the world.² Dr. C. M. Breder, Jr. and T. H. Howley of the Aquarium's staff, instigated by Dr. Homer W. Smith, devised a means of maintaining the proper alkalinity of sea water through the neutralization of acidifying wastes with bicarbonate of soda. In effect they treated the sea water circulation for acidosis. Subsequent studies by Dr. Breder indicated the importance of calcium in successfully keeping captive fishes, and in practice this is added to the water by putting coral sand (calcium carbonate) in the tanks.³ Not only does the rectification of sea water hold the fishes and inverte-



Most marine fishes do not significantly “condition” or chemically change the water in which they are kept—at least to the extent of making it unsuitable for other species—but exceptions are the sharks, skates and rays. These are Cow-nosed Rays that come from the Atlantic coast.

brates in better health, but it greatly lengthens the time a given amount of it can be employed in a closed circulation without addition or change, thus saving considerable time and money.

For sea water is one of the most difficult and costly of all substances for public aquariums to come by! That an institution often situated by the shore should have difficulty getting proper sea water seems absurd, yet is all too true of the great majority of coastal public aquariums as well as the inland ones. Two seemingly unrelated factors have brought about this paradox: the extreme sensitivity of the majority of marine creatures to changes in their environment, and the geographical location of most public aquariums.

Living things are usually no more versatile than nature requires them to be. The well-

known Guppy, for instance, is a most adaptable fish because its natural habitat is more or less regularly subject to changes bordering on the catastrophic. During the day the tropical sun may heat the small ponds in which it often lives to almost 95°F., while at night the temperature may drop thirty degrees below the maximum. Droughts often dry up its home, so that the little water left teems with fishes and in consistency approaches liquid mud. Then torrential rains may quickly change this morass into a miniature flood. Contrast this state of affairs with the home of a typical coral-reef fish. Bathed in a volume of water to all intents and purposes infinitely large, it is shielded from any sudden change of density or temperature by an environment which alters almost imperceptibly or not at all. Such a fish is apparently unable to adapt

itself, and relatively slight alterations in the chemical or physical properties of the water surrounding it are fatal.

Therefore only the purest of sea water will suffice to hold captive coral-reef fishes and many other marine forms; but the sea water around most coastal public aquariums is far from pure. Aquariums are built near or in large cities, and large cities are generally located near rivers. A sizeable river profoundly alters the density and chemical components of the ocean about its mouth — if it carries sewage or industrial effluents, so much the more. In order to procure unadulterated ocean water, suitable for its more delicate marine specimens, the old New York Aquarium at the Battery used to send tankers fifteen miles away from the Hudson's mouth at flood tide, since only under those conditions could undiluted and unpolluted sea water be obtained.

As far back as the 1850's, when small marine aquaria were just becoming known, uncontaminated sea water was not easy to get. Philip H. Gosse, who did more than anyone else in Great Britain initially to popularize the hobby of home aquaria, recommended that the London amateur give a cask and "a trifling fee to the master or steward of any of the steamers that ply beyond the mouth of the Thames, charging him to dip it in the clear open sea, beyond the reach of rivers."⁴ It was he who first tried to resolve this difficulty by maintaining marine creatures in *artificial* sea water. He found that his most careful imitations were unsuccessful, however, unless he "seasoned" his concoction with some seaweeds for at least a few days. Just what these plants did to the water he knew not, but he suspected that they gave off "spores" which somehow made it suitable for habitation. His experience has been confirmed many times, save that in modern practice an inoculation with fresh, natural sea water is employed, rather than with seaweed. No one can yet explain what the "live" sea water does. If a tankful of natural ocean water is evaporated to dryness, leaving the sea salts encrusted inside, and then refilled with distilled water, no chemical analysis has been able to detect a difference between the original and the reconstituted substance, but the latter will not be suitable for the great majority of

marine organisms until some natural sea water has been added to it and allowed to "work" in it. Even when so treated, we have found that many of the more delicate fishes and most invertebrates will not thrive in it. For this reason artificial sea water is employed only as a last resort.

The corrosive action of salt water is well known, but the problem of corrosion in an aquarium goes far beyond that and concerns both fresh and salt water. Any water in which fishes have lived for some time becomes fretting to a great variety of substances. For example, no metal or alloy ever tested by the New York Aquarium has proved capable of resisting all corrosive action of tank water. The action may not be extensive, but it is sufficient to poison the fishes and invertebrates exposed to that water. It takes amazingly little dissolved metals to injure or kill aquatic organisms. Lead salts are fatal to some fresh water fishes in concentrations of only 0.3 parts per million.⁵ The Three-spined Stickleback succumbs to solutions of 0.1 part per million of lead, 0.02 parts per million of copper and 0.003 parts per million of silver.⁶ In other words, four ten-millionths of an ounce of metallic silver dissolved in a gallon of water can be fatal to fishes! It is no wonder that all metals are taboo for an aquarium's tanks, pumps, filters and piping.

ALL THESE various factors have been taken into consideration in the planning of the new Aquarium. Every water-carrying object is to be constructed of chemically-inert hard rubber or plastic. Large reservoirs for the storage of sea water are located in its basement, and laboratory space and equipment to analyze and control the precious fluid are provided for.

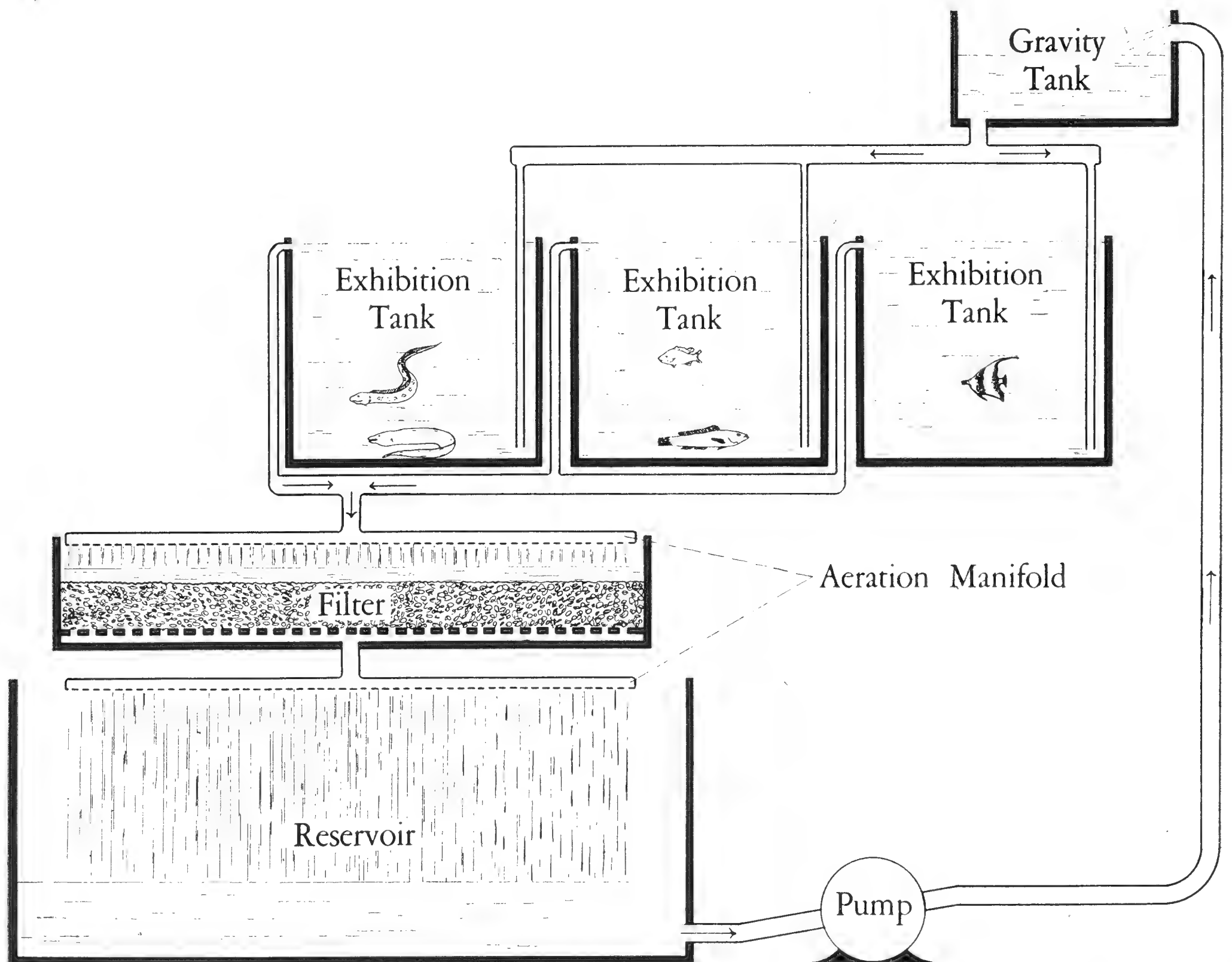
So far we have seen that aquatic animals require a great diversity of waters if they are to be kept in captivity and that some of these waters — especially pure sea water — are difficult to obtain. We have also seen that organisms alter the chemical content of the water in which they live and that an aquarium must take special precautions to counteract these changes in order to keep its specimens healthy and contented. However, the multiplicity of major water-systems (forty) and kinds of water (about one hundred)

planned for the new Aquarium is not entirely in answer to the above requirements. Two additional conditions make so many separate circulations a virtual necessity.

One is what aquarists and fish fanciers call water "conditioning." We have already spoken of the gradual accumulation of fish wastes in the water in which fish are living. These substances — and perhaps others emanating from the fish's body — change the surrounding water and, surprisingly enough, make it more suitable for the fish. Ordinarily we think of bodily wastes as being entirely harmful, but with fishes this is not so; every home aquarist knows that his pets thrive better in water they have "conditioned" to suit themselves. No scientific investigator has yet been able to determine just how or why this

conditioning comes about.⁷ Nevertheless, it is of prime importance to all aquariums, since fishes not only alter their liquid environment, making it better for themselves, but at the same time they frequently make it injurious or even deadly to other species.

Curator-Aquarist C. W. Coates has reported the following experiment demonstrating this phenomenon. He set up three identical, ten-gallon aquaria, one with *Scalares*, one with *Mollies* and the third with both these species of small, tropical fishes. The total weight of fishes in each tank was nearly the same, and there was approximately the same weight of *Mollies* as of *Scalares* in the third. After three weeks, *Scalares* put into the Mollie tank, and vice versa, died over night, so changed had the waters in these two tanks



A diagrammatic sketch of a typical closed circulation in the new Aquarium we are planning. Through such a system the water makes a complete circuit on an average of ten times a day. Necessary heating or cooling of water is done by means of units built into the large reservoir.

become. In the third aquarium, however, the two species lived together, although they did not reproduce as they did when kept by themselves.

The necessity of "balancing" one species against another in tanks containing physiologically antagonistic forms is very apparent from the above experiment. Both aquarist and tank-man must be constantly alert to detect signs of incompatibility and must continually draw upon their experience as to what species will or will not live together. Some fishes are almost 100% incompatible. Water in which Electric Eels have lived, for example, is fatal to almost all other tropical, fresh water fishes, Curator Coates has found. For this reason the Electric Eels are provided with their own private circulation in the new Aquarium. Among marine fishes, antagonistic, water "conditioning" effects are not prevalent. The outstanding exception is probably that of the sharks, skates and rays. Like the Electric Eels, these, too, have been given water systems more or less for their exclusive use in the new Aquarium.

The second factor calling for many smaller, separate water systems, rather than a few large ones, concerns the diseases and parasites of captive fishes. Where large numbers of specimens are living in the same water the chance of epidemics is very much greater. In the New York Aquarium during 1939, 1940 and 1941, infectious and parasitic diseases caused approximately 50% of the recorded deaths of marine and temperate fresh water fishes, and less than 15% of those among tropical fresh water species.⁸ The significance of this is perfectly clear when it is pointed out that the marine and the temperate fresh water fishes were maintained in large, closed circulations with many specimens sharing the same water, while the tropicals were kept in separate tanks with relatively few individuals in each.

The most devastating of the afflictions of captive fishes are spread through the water, directly from fish to fish, and it is unfortunately true that in general the more suitable the water is for the fishes, the more satisfactory it is for the infective agent. In the new Aquarium the presence of many separate water systems will enable us to hold specimens in quarantine until proved free



Thomas Howley of the Aquarium staff manipulates Van Slyke apparatus, essential to the chemical analysis and control of sea water.

of infection acquired in nature, to keep susceptible species away from those which are often "carriers" and to check any incipient epidemics by isolation and treatment. The lifeblood of the new Aquarium thus can be cleansed of parasites or other disease-producing organisms, just as a physician treats our own blood when it becomes the carrier of infection.

¹ U. S. Bureau Fisheries Doc. 1045 (Rept. U. S. Comm. Fish. 1928), 1929.

² Breder and Howley: *Zoologica*, 9 (11): 403-442, 1931.
Atkins: *Jour. Marine Biol. Assoc.*, 17: 479-481, 1931.

³ *Zoologica*, 18 (3): 57-88, 1934.

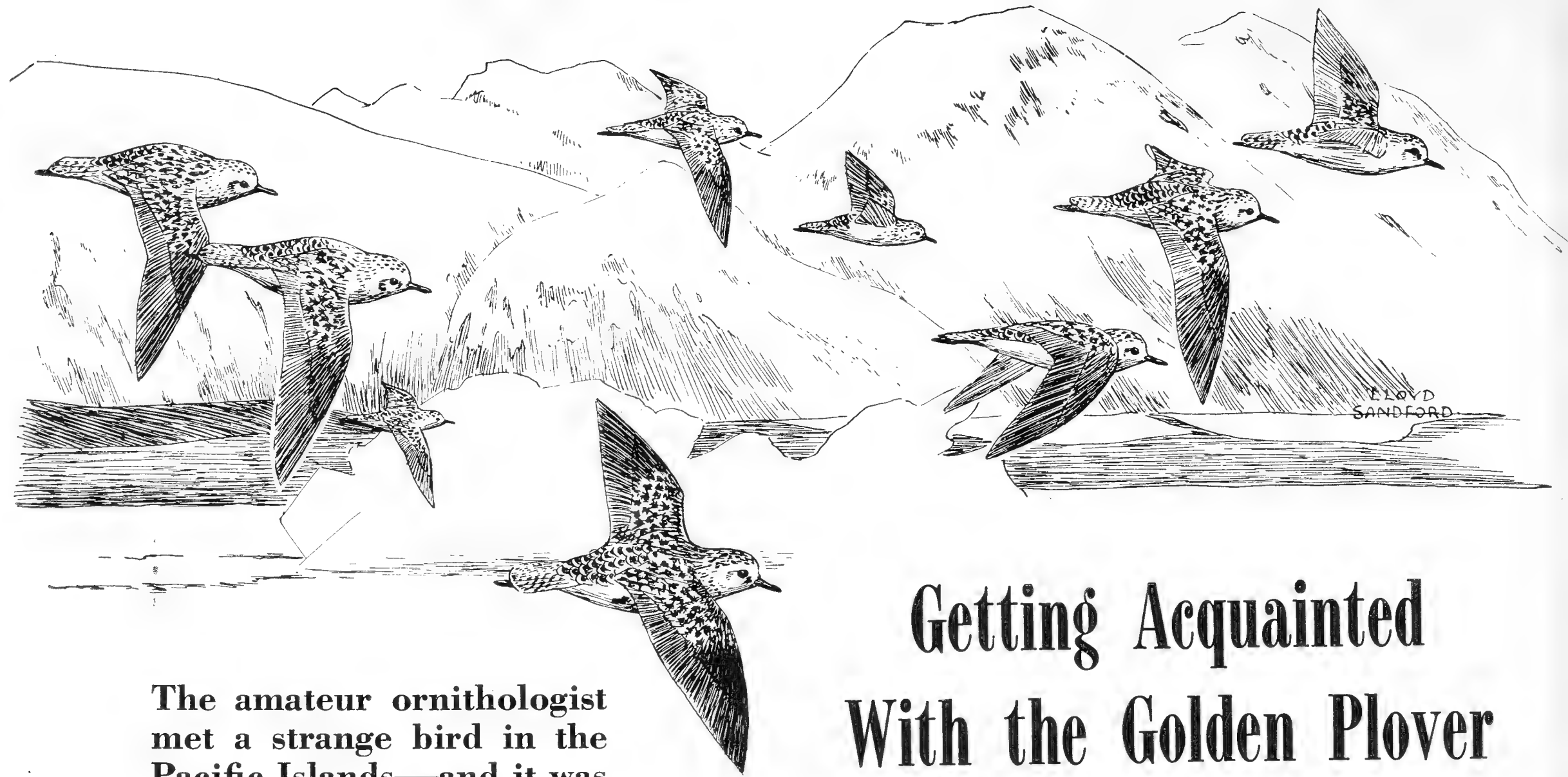
⁴ "The Aquarium, an Unveiling of the Wonders of the Deep Sea," London, 1854.

⁵ Carpenter: *Jour. Exp. Biol.*, 4 (4): 378-390, 1927.

⁶ Jones: *Jour. Exp. Biol.*, 15 (3): 394-407, 1938.

⁷ Allee: "The Social Life of Animals," New York, 1938.

⁸ Nigrelli: *Zoologica*, 25 (33): 525-552, 1940; 28 (22): 203-216, 1943.



The amateur ornithologist met a strange bird in the Pacific Islands—and it was even stranger when he saw it in the Zoological Park.

Getting Acquainted With the Golden Plover

By **RICHARD T. BRICE**

I'D LIKE to be able to start this story off by insisting that I know my friend the Pacific Golden Plover when I see him, whereas the very opposite is nearer the truth. Somehow, I never seem to recognize him, maybe because he keeps bobbing up in the oddest places.

In case you aren't acquainted with the Pacific Golden Plover (*Pluvius dominica fulva*), I should explain that this is the plover that breeds in Alaska and along the northern shores on both sides of the Pacific Ocean. He has a first cousin (*Pluvius dominica dominica*) in the north Atlantic. Occasionally, when the wind is on-shore during their annual trip south, which they make every fall, some of the Atlantic Golden Plovers visit New York State. I've never met any of them, but I doubt if they can be more charming than my Pacific acquaintances.

I first met the Pacific Golden Plover in the Solomon Islands in the quiet of late afternoon when I was walking along an abandoned road watching maroon-winged dragon flies darting and hovering over the shallow puddles that ever mark old roads in rainy countries. This was somewhat of a coincidence, since at the precise moment when I saw him the plover was also walking along the road and he also was observing the insects around the puddles, though he seemed

more interested in the crawling things of the mud than in the dragon flies. Plovers, I gathered, take their entomology quite seriously, since my friend had brought several members of his family to help collect specimens.

I stopped and watched the family for quite a while but after I had returned to my base the only description I could give of the bird was "a grey and white speckled bird much bigger than a Robin, with long legs, a white streak lengthwise of the wings (visible only when the bird is in flight) and a white trim on the tail."

The following week I took my more advanced ornithological friend, George Greeley, with me and rewalked the old road — but no plovers! It was about the third week in May, 1944, and we saw no more of them during the winter — June, July and August are winter "below the line." Fortunately, Greeley had seen these birds before, and was able to identify them from my description and the locale where I had seen them, or I would not have known what manner of bird I had observed.

The next time I saw a plover was about the fifteenth of the following September. I was coasting the island of Santa Ysabel as a passenger aboard a Navy landing craft, and made an entry in my log concerning "some new birds that re-

semble large Sandpipers and skim gracefully around our craft in the cool of morning and evening." At the completion of this trip, when the Navy kindly brought me back to my home island, Greeley announced the return of plovers with numerous progeny, and when he took me to see them I at once recognized my "large Sandpiper".

It was during that same summer — around December — that the plover tribe became suspect by our ornithological FBI. Scrub typhus — one of the most violent of tropical diseases — had broken out among our troops on Bougainville and New Guinea and the medics were worrying about it spreading. Transmission of the disease is blamed on a certain kind of chigger (the larval form of a harvest mite, *Trombicula akamushi*) which inhabits the tall kunai grass of the region — and some chiggers which resembled the disease carriers were found on a plover collected at Torokina, Bougainville. This could have been really serious, since the plover's southern migration extends all the way to Queensland, Australia, and it winters (or summers, if you wish) over the entire South Pacific from Hawaii to New Caledonia. Fortunately the bird-infesting chiggers only resembled the disease-carrying *Trombicula akamushi* (they were really another type named *Acariscus pluvius*), so the plover turned out to be a complete flop in the role of arch-villain and spreader of disease.

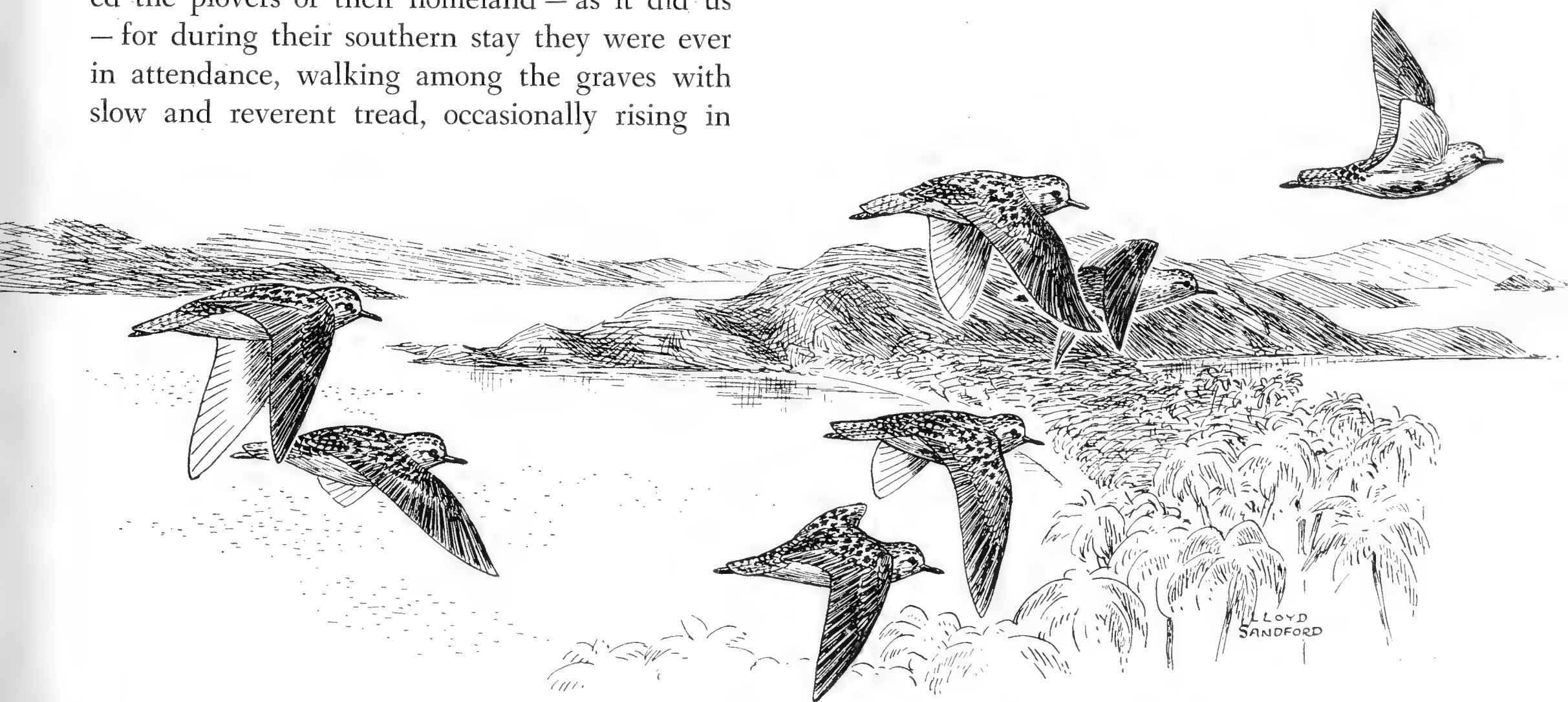
In January of that summer — 1945 — I moved from the Russell Islands to Guadalcanal, and there I saw plovers in the new and altogether different role of caretakers at the Island Cemetery. Perhaps the rich and well-cropped grass reminded the plovers of their homeland — as it did us — for during their southern stay they were ever in attendance, walking among the graves with slow and reverent tread, occasionally rising in

short soaring flights to skim at cross-top level from one part of the cemetery to another. Well do I remember watching through the glassless windows of the palm-thatched church and noting how they were seemingly undisturbed by the songs of worship with which we made the welkin ring each sparkling Sunday morning.

In February I left the 'Canal, and saw no more of the plovers — of whom I had become exceedingly fond — until about the middle of the next September. This time I had been, by the grace of God and the capitulation of the Japs, twenty days at sea. We were a few hundred miles north of the Hawaiian Islands and, armed with Alexander's *Birds of the Ocean*, I was passing the time by trying to identify all the birds that came our way. There had been few to see that morning and I was about to leave the rail and go below when I noticed what I thought must be a dark tern skimming and swooping about the ship — only Mr. Alexander had apparently overlooked this species, for it had something faintly resembling long white stripes lengthwise of the wings, and I found nothing similar among his plates of oceanic birds.

Yes. Of course it was the Pacific Plover. But I knew him as a land bird (as did Mr. Alexander, and rightly so) and I never expected to see him so far at sea, although I had read that during his prodigious migrations he can fly from the Alaska mainland to Hawaii non-stop. Non-stop, that is, except for perhaps a brief rest on a passing ship, and we were passing just at the time of his migration.

I saw no large flocks of plovers on this trip, just groups of two or three skimming about, but sev-





Out-of-breeding plumage of the Golden Plover is quite apparently different from that of the breeding season. It is more gray and white.

eral landed on the deck, mostly on the hatch-covers where little puddles of fresh rainwater were available. Water seemed to be their greatest want, rather than food, though they did considerable wandering about the deck as if searching for something. We put out bits of bread, but none of our visitors would touch it, and each bird took off and disappeared after getting a drink and stretching his legs about the deck for a few hours. One group of four plovers spent an afternoon in a lifeboat, running up and down after the rain water as it sloshed fore and aft with each pitch of the ship. They were still there next morning, but took off before noon.

So the Pacific Plover passed out of my life for another seven months, during which time I became a civilian and moved to New York — far, far from plover haunts. Then one day I walked into the Bird House at the Bronx Zoo (this was about my third visit, or so) and there, right before my eyes, was a gold-and-black speckled bird, much larger than a Robin and with long legs. I

was certain I ought to know him, and I studied him quite a while before I gave up and read his name on one of those neatly printed little cards which the Zoo uses to enlighten such as me. He was the Pacific Plover, of course, only he was beautifully speckled with rich gold and warm brown. This didn't seem right at all, because he should be gray and white. That was the way I had seen him and learned to recognize him. The Zoo shouldn't do things like this to me, and I rushed right in and told General Curator Crandall so.

Mr. Crandall received with admirable fortitude my unnerving discovery that his Golden Plover is golden. The plover, he gently pointed out, has two suits — a set of golden tweeds which he wears to work (nesting, hatching business in the north), and some gray and white slacks for lounging around the southern beaches. This is



In breeding plumage, the Golden Plover wears "a set of golden tweeds," and then he really corresponds with his name. On breast and neck, the bird is black, as it shows here.

not an uncommon phenomenon in the bird world but, as I confessed in a previous article in *ANIMAL KINGDOM*,¹ I am just a beginner in the art of bird identification, and apt to overlook such elementary explanations.

But I do know now that the Golden Plover is really quite a well traveled character, and that

¹ Birds Among the Coconuts, *Animal Kingdom*, Vol. 48, No. 3, pp. 32-43.

he has somewhat more than his share of dangerous adventure as he gets about over the earth. No doubt this is what makes him so interesting and why I grow more fond of him every time we meet. I have given up trying to figure out where he will appear next — but, wherever it is, I hope that maybe, just maybe, I will recognize him when I see him.

How We Made the Acquaintance of the Golden Plover

By LEE S. CRANDALL

ANYONE WHO undertakes to write a tail-piece for one of Major Brice's charming accounts of his experiences with birds, must think first of a sound excuse. And this time there really is one. There is a story that should be told concerning our Golden Plover that showed Major Brice, for the first time, the lovely golden livery which gives the bird its name.

Because of its extremely long migration flights and its seemingly mysterious comings and goings in far places, the Golden Plover is an especially apt vehicle for the dissemination of knowledge. Everyone should know about the Golden Plover and what better means for making it known than the living bird itself? That is why President Osborn urged the Bird Department constantly and consistently to obtain specimens. But there is no market in Golden Plovers and no established source of supply. So just as constantly and just as consistently, we failed to satisfy the President's desire.

In the midst of our futile strivings, a shipment of birds arrived from the far East. The usual inspection was made and various selections decided upon. A day or two later, the collector who had gathered the shipment called up to say that

he had bought in Surabaya, Java, a crate of birds intended as food for some small carnivore he was bringing. They were ordinary things, commonly sold in the native markets for food and presumably of no value to us. Four or five were still in the crate and would we take them for whatever they might be worth? Ordinarily, pig-in-a-poke buying is not our method but for some reason we agreed.

The date on which the crate arrived is memorable and should be recorded: May 17, 1939. For along with three or four dejected White-breasted Rails, that crate contained the first Pacific Golden Plover we had ever received.

Our scattered experiences with the Golden Plover of Europe and western Asia had not been happy, for we had always found it difficult and temperamental. But this bird was different. He was neither depressed by his situation nor elated that he had escaped the maw of the rapacious creature for which he had been intended. He was, in fact, in perfect condition and so he has remained for more than eight years. And for all those eight years, he has preserved us from those constant urgings for Golden Plover. Live on, sweet bird!

The Sea Beaver Is Coming Back

By BEN EAST
Field Editor, Outdoor Life

ON ONE of the loneliest and most forbidding island chains in the world the United States government is now bringing back from the threshold of extinction the most romantic and costly fur bearer in the long history of the pelt trade.

The islands are the Aleutians, bleak, volcanic, fog-ridden string of land dots that curve westward for 1,200 miles from the mainland of Alaska, a boundary line between the north Pacific and the gray wastes of Bering sea — the Aleutians that from June of 1942 until May of 1943 were a major theater of the war with Japan.

The animal that is returning from the road-of-no-return is the Alaskan Sea Otter, the "Sea Beaver" of the old Russian fur traders, for whose glossy pelt all of Alaska was explored and colonized and looted. After more than a century and a half of merciless persecution, a period that reduced the world's sea otter population from uncounted thousands down to hundreds or even scores, man at last is paying his debt to these strange, shy children of the kelp.

The Sea Otter is in reality a weasel, a distant cousin of the ermine-coated animal of that name known to every outdoorsman and trapper in the northern United States and Canada. He is more nearly related to the land otter that is a prized pelt bearer from Florida to Hudson Bay, from Labrador to the Northwest Territories. The strange otter of the sea and the common otter of the United States and Canada are next of kin indeed. But the Sea Otter is far larger, averaging four to six feet in length and some seventy pounds or more in weight, in contrast with the fifteen to twenty pounds of his land-dwelling kinsman. As a matter of fact the otter of the kelp is the biggest

member of the bloodthirsty clan to which he belongs, outranking by many pounds the terrible Wolverine that is the king of weasels. But he has lived too many generations in the sea, has fed too long on shellfish in place of warm-blooded prey, to keep the cruel and savage ways that make his tribe renowned. He lacks the snarling ferocity of weasel and mink and fisher. Curled on a bed of wet kelp, he has the benign appearance of a grizzled and friendly old dog and his manners are as mild and inoffensive as his looks.

The mother Sea Otter is famed among wildlife authorities for her solicitous care of her single pup. Until the infant is old enough to look out for himself she carries him through the sea under one arm, in a strangely human fashion, swimming on her back, rolling and playing with him in the long ground swells, leaving him cradled in a thick tangle of floating kelp when she dives down to the submerged sea urchin colonies that are the pasture ground of the otters.

When the pup is old enough to travel under his own power she still watches over him, guides him to the underwater rocks where the sea urchins are most plentiful, teaches him to take shelter in the kelp beds as a cottontail hides in a briar patch. Those great floating gardens of the sea, fringing endless miles along the rocky beaches of the Aleutians, are the natural refuge of the otter. In them he finds solitude and shelter, an abundance of his favorite food, sanctuary from man and his natural enemy, the dreaded killer whale. In the open sea the otter has no chance against a pack of those blood-mad, finned greyhounds. But among the long, waving strands of the kelp he can turn and dodge and elude and hide, and the seaweed closes its thick and twisted

All photos by U. S. Fish and Wildlife Service.



The unpeopled, volcanic Aleutians present a grim and forbidding picture to ships that approach the harsh shores where the Sea Otter makes its home. For much of the year these snowy peaks and the rocky shoreline are shrouded in fog, and here the Otter is now safe.

net behind him as if eager to protect this harmless creature whose second mother it is. Once in the kelp the otter's chances of escape are good. And so he limits his range to those places where the sea urchins are abundant, where the groundswell breaks upon wild and lonely beaches — and where the kelp beds afford an ever-waiting haven. Look for him in such spots in the Aleutians and you will find him if you find him at all. Often if he is present in numbers he betrays himself by a strange telltale sign upon the beach, despite the fact that no otter has set foot there for many months.

The sea urchins that are his bread and butter are small, round shellfish that cling to the sub-

merged rocks, covered by a round, symmetrical shell shaped vaguely like an old-fashioned, silver pocket watch. Probably for additional protection, the shell is thickly armored with sharp spines a quarter-inch or more in length.

The otter's method of breaking into this spiny treasure house is simple and direct. He dives down, selects an urchin, tears it loose from its anchorage and brings it to the surface in short, powerful forepaws that look much like tom-thumb boxing gloves. There he floats serenely on his back, hammers the shell to fragments with his breast for an anvil and crams the succulent parts into his mouth. The spines broken from the shell are buoyant enough to float and the



The Sea Otter is a true child of the kelp beds. Tangled thick masses of this sea weed cling along the shores of the Aleutians, and nature has taught the Otter to take refuge in this floating garden as a cottontail rabbit might dive for safety in the midst of a briar patch.

ground swell carries them in, a few at a time, and deposits them on the black, volcanic sand of the beach. So that, if an otter colony has fed long in a sheltered cove, a thin band of these white or greenish spines will overlies the dark sand just above high tide line, as conspicuous as the dark ring around an untidy bathtub. Often that band of alien color on the beach of a remote island is the first intimation that a band of otters is hiding in the offshore kelp.

The first white men to look upon the Sea Otter, the first to appraise his lustrous pelt and even surmise its value, were the sailors of the Russian expedition that discovered Alaska 206 years ago.

Sailing from the Siberian coast in the early summer of 1741, under command of the great navigator Vitus Bering who was to give his name

to the then uncharted sea that washes the shores of Kamchatka, they reached their goal in July, turned back and wandered, lost and scurvy-ridden, through the treacherous channels of the Aleutians all through the remainder of that fateful summer.

They were wrecked in early winter upon the Asiatic islands that still bear the name of the Commanders in honor of the dauntless leader of the expedition. He died a few weeks after he was carried ashore and the men of his party settled down in miserable huts to live through the winter upon the carcasses of dead whales cast ashore, plus such sea animals as they could kill. The island afforded four kinds, the giant sea cows that were to be exterminated by the otter hunters within little more than a decade and a half, the great yellow-brown sea lions of



This is typical of the Sea Otter's habitat—rocky ledges where the kelp beds grow, uncovered at low tide—and with a safe and contented Otter basking. They are shy animals, and extreme skill and wariness are necessary if the photographer of such a scene can get close to them.

those northern oceans, the fur seals and the thick-furred, gentle creature that the Russians named *bobrof*, beaver of the sea. All four were animals unknown along the coasts of Europe. These Russian mariners were the first white men to observe this quartette of interesting wild creatures. And their interest was chiefly elementary. They were starving and the sea animals were good to eat.

During the winter they killed some 800 otters. In spring those who had survived the cold and scurvy and despair set about the task of escaping from their nameless island. From driftwood and the wreckage of their ship they built a small, makeshift craft. When the time came to dare the sea once more, their impulse as discoverers and traders asserted itself. They took back with them to the Siberian mainland the otter pelts, softer,

thicker, finer furs than the eyes of civilized man had ever beheld before. So the bloody otter trade was born.

For more than a hundred years the Russians pushed it unflaggingly. It was their one reason for searching out the further reaches of the storm-swept Alaskan coast, for sending ships and bands of Cossack soldiers into this forbidding, new-found wilderness, for planting trading posts and colonies ashore. Save for the Sea Otter and the exorbitant value of his pelt it is hardly likely Russia would have paid the price, in toil and rubles and blood, to set her flag firmly along three thousand miles of wild and trackless coast there in the northwest corner of a continent far removed from her nerve centers in eastern Europe.

Wherever the Sea Beaver was found, there the Russian traders and fur hunters followed.

They waged upon the otter colonies a war untempered by mercy or foresight, a war of extermination. They looted the beaches and the kelp beds without thought of the future. The otter kill soared year by year. The Russian warehouses at Sitka and Unalaska and Kodiak bulged with pelts. The total harvest mounted into the thousands, the hundreds of thousands. In a century the Russians shipped home perhaps half a million Sea Otter skins.

For the first forty years they did not even succeed in locating Alaska's greater treasure house of furs, the nearby Pribilof islands on whose rocky beaches the huge American fur seal herd, then numbering six million to ten million animals in primitive abundance, went ashore each spring to breed and rear its young. The Russians were content, during those forty years, to take what seals they could as they migrated through the Aleutian passes, and to drive on with the otter harvest.

And simultaneously they waged another war, equally ruthless and even more bloody, upon the Aleuts and the coastal Indians who shared the Sea Beaver's lonely haunts. No other chapter in the Colonial history of this continent quite matches the chapter of those early decades in the otter trade and the exploitation of Alaska.

In return for their hardihood and daring, in exchange for their willingness to spill either otter blood or Indian blood without limits or compunction, the fur hunters reaped undreamed-of wealth in the most precious pelts their conscienceless trade had ever known. Ships that sailed home from Alaskan waters with 5,000 Sea Beaver skins taken on a single voyage broke no records. The price of the otter pelts mounted and the demand grew. Sable, long counted the world's richest fur, bowed to a new queen in the marts of fashion. Beaver and sealskin trailed far behind. Other ships joined the plundering Russian fleet. The flags of Britain and striping America sailed along the otter coasts, made calls of trade at lonely islands. Otter hunting became a profession, luring men from occupations less profitable and adventuresome. And decade by decade the great otter herds shrank, the kelp beds turned less and less populous, long stretches of the Pacific beach knew the Sea Beaver no more. The day came when the whole Aleutian district

produced fewer than twenty otter pelts in a year. That was the same district where single islands had yielded up 5,000 to a hunting party in one winter.

Alaska passed from Russian hands to American, but the otter was given no respite. What few remained were hunted down ever more painstakingly now that so few were left and the inflated value of rarity had been added to the natural costliness of the silken skins. In time an otter schooner counted itself fortunate to take a dozen skins in a full summer of hunting. And well it might, for by that time traders were paying \$2,000 for a single fine otter pelt on the schooner's deck, and a price of \$2,500 at the London fur sales occasioned no comment.

Then when it seemed certainly too late, the otter of the sea was reprieved. In 1911 the widely known treaty was concluded between the United States, Great Britain, Russia and Japan affording better protection to the dwindling fur seals of the Pacific by outlawing sealing in the open sea. The same treaty banned otter hunting outright.

Most authorities held little hope that any real result had been achieved so far as the sea otter was concerned. He was too far on the road to extinction to come back, they reasoned. It is not necessary to kill the last individual of a wildlife species to wipe it forever from the earth. Once its ranks have been made thin enough, natural forces inexorably drive it the few remaining steps to annihilation.

For more than twenty years the issue hung in the balance and for the most part those who spoke of the otter at all spoke of him as a vanished breed. Hardly a reputable mammalogist hoped to look upon a living Sea Otter again. Still, stories filtered out of the Aleutians, stories told by Aleuts and relayed by traders, of scattered otter bands, of Japanese ships that raided them, of petty poaching by our own nationals. There was enough smoke in these tales to keep alive the spark of hope, and six years before the Pacific war began the United States Navy sent a ship to investigate and learned that there was at least one thriving otter colony along the coast of an unpeopled island in the central Aleutians.

Every possible protection was thrown then over the lonely island chain. The Aleutian Wildlife

Refuge was created, largest of its kind in the world, and made the special charge of the United States Fish and Wildlife Service. A ship was assigned to patrol duty, the co-operation of the few Aleut villages was enlisted and the safeguards of the law became so ironclad that even unscrupulous traders said contraband otter pelts no longer had any value. They were too "hot" an item to market anywhere on the North American continent.

Then came the war in Alaska, and the hopes of American wildlife specialists for the growing otter herd went down to the bottom of the glass. There seemed little chance the scattered bands of shy and wary otters could endure and survive the Japanese invasion of the western Aleutians, the fortification of many of the islands by our troops, the unavoidable activity of war. The Sea Otter is by choice a dweller in silent places.

But his government guardians kept watch over him as best they could, maneuvered for his welfare and refused to give up hope altogether. And now the news is far better than had been anticipated. The otter has not disappeared. On the contrary, he has held his own or even gained slightly in numbers in the last half decade. Wildlife specialists of the Fish and Wildlife Service now report that there are perhaps 2,000 to 3,000 of his kind in the Aleutian colonies at present. From now on the increase should be steady and fairly rapid. The patrol ship has returned to duty. An Alaskan wildlife agent who knew the otter country and managed to stay in the Aleutians through most of the war is still there, guarding his charges with a vigilant eye. There appears no question that the most historic of all fur bearers is not to vanish from the earth. The Sea Beaver's comeback seems assured at last.



An occasional Sea Otter skin is now taken by the Aleuts, from animals found dead on the beach, but all such skins must be turned over to the Government. Only by such strict supervision under law can an illicit trade in the pelts be prevented — and it is being prevented, too.

RANDOM MIDSUMMER NOTIONS

In Anticipation of Autumn

By DONALD T. CARLISLE

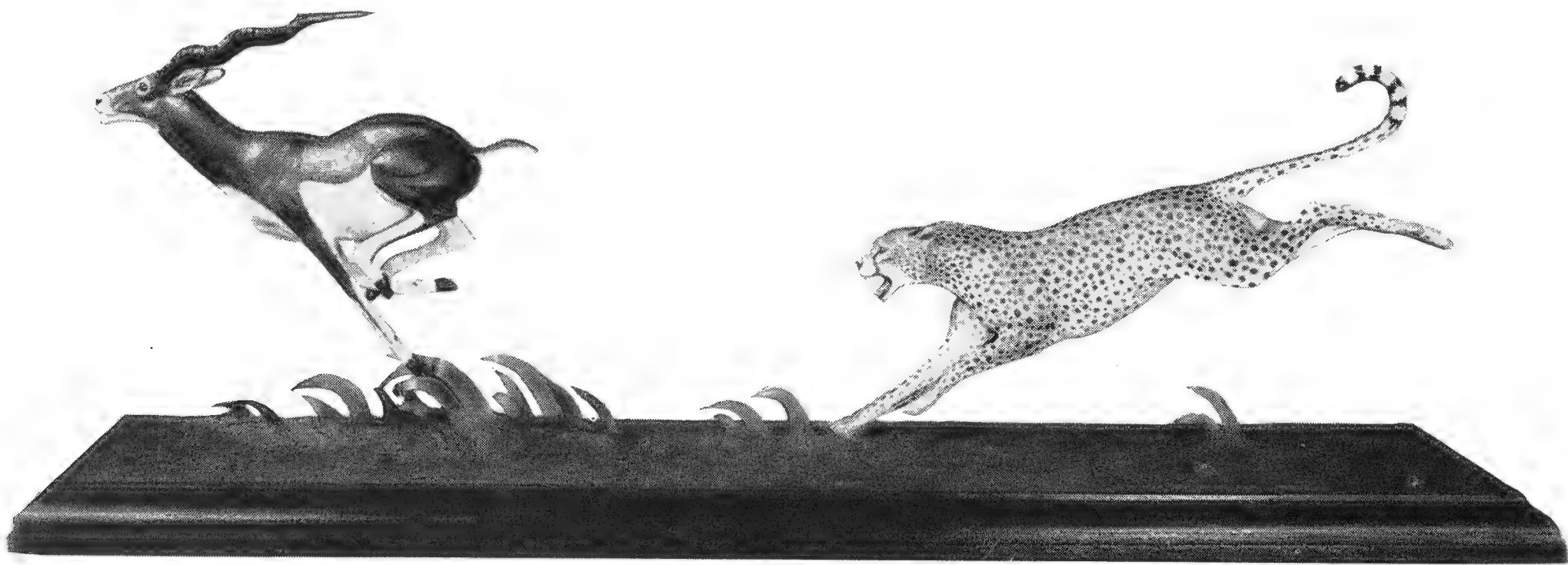
THOSE OF US at the Park who seek to serve the Society's membership and the many thousands of the public thronging the Zoo these days are sometimes rudely shaken. Every now and then some sin of omission brings us up short. For example, there was the letter from an irate member complaining that she had gone to some trouble to have her little girl excused from school especially to attend the Platypus preview. Then, having convoyed the child to Central Park for this purpose, she learned that there they knew nothing whatsoever about the Platypuses — and thus the day was ruined! We were sorry over this incident, of course, and willing to take a little blame.

We assume too much, perhaps. Having originated the New York Zoological Park, popularly known as the Bronx Zoo, and having operated it at this one point (and no other) since 1899, we conclude that *everybody* knows where it is. Apparently such is not the case, for this good lady is not alone in her plight. Several other people have written that they would be pleased to attend

the spring Garden Party at the Park if they but knew where it was to be held. There were also some 'phone calls in the same vein.

We are hastening to prepare a map showing where the Zoo is, and its approaches by highway and by public conveyance, useful not only to city dwellers but to our many friends in Westchester, Long Island, New Jersey and Connecticut. This map will help some, we hope, but how can we reach that considerable group of people whose names we do not know who would like to visit us if they had some idea of our location? Advertising possibly would do it, but that costs a lot of money.

We have done some experimenting in new ways of bringing more people into touch with the great beauty of the Park and its inhabitants. This spring we entertained several clubs and organizations with Dutch treat luncheons at the Zoo Bar followed by conducted tours of the exhibits. On the whole we believe they were successful and that our guests enjoyed themselves. There *was*, of course, that moment when a



"Cheetah Chasing a Blackbuck," by Louis Paul Jonas, in the Members' Art Show.

tractor train — laden with august bankers, lawyers and so on from the New York State Chamber of Commerce — refused to negotiate a slight hump, and these eminent passengers were forced to alight and literally put their shoulders to the wheel!

With your indulgence we would like to extend and improve our entertainment service to our membership. If you are interested in a club or a lodge or an association that you think would enjoy taking pot luck with us, we would like to try to entertain it or them. Week-days are best, in the early fall or spring. Summer is not so satisfactory and in the winter many animals are not on view. If this idea appeals, just write a note to, or telephone, the author of this little piece at the Society's downtown office, 630 Fifth Avenue, Circle 5-5750, and an agreeable date can almost certainly be arranged. This invitation holds, naturally, for study groups, Scout troops, any other units that may or should be interested.

The Society, together with the Zoo and the Aquarium, wants to serve the membership in other ways as well. Some thirty member artists

are currently exhibiting a variety of animal paintings, drawings, sculpture and carvings at an art show in the Heads and Horns building. Later we hope to have a show of members' work in animal photography. Other special attractions of this sort are being planned. We are able within limits to supply speakers or films or both for club or organization meetings away from the Park, provided that requests are made well ahead.

The Society is a service organization. Our principal duty is to entertain people — nearly 3,000,000 of them a year — with beautiful or unusual animals in beautiful surroundings. To the extent of our means we want to play host on these special occasions, too. Remember, however, that the most entertaining among us are few in number and pretty busy people. We will try our best to fit ourselves to your plans, though it may sometimes be necessary to compromise.

Remember, too, that we like to receive suggestions and we pay attention to them. If you have any, send them in. It is also helpful to have your changes of address. Makes it easier to get this magazine to you on time, for instance.

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BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

"First Time" Rarities

As the years roll on it becomes harder and harder for animal collectors to bring back animals that really make the staff of the Zoological Park throw its hat in the air, for most of the great rarities at one time or another have passed through our collection.

Nevertheless, the entire staff was shaken out of its calm on Sunday, July 6, when a shipment of very great rarities arrived from the Philippines, and we acquired two Tarsiers, two Tree Shrews, two Bushy-tailed Giant Rats, two Cuming's Giant Rats — all of them, so far as we know, never before exhibited in any zoological garden — and also the extremely rare and interesting Monkey-eating Eagle of the Philippines. We acquired, too, four monitor lizards and three green snakes from the same shipment.

The animals were collected by Charles Wharton of Atlanta, Georgia, a young ex-soldier who determined while in military service to take up a career as an animal collector, and who produced this extraordinary group of "firsts" on his initial venture.

The rarities reached us too late to be photographed and discussed in this issue of *ANIMAL KINGDOM*; we will hope to do them justice in the next issue.

Research Fellows at Work

Animal behavior studies in the Zoological Park started on June 26 and will continue until the reopening of colleges and universities in the fall will require the withdrawal of the four Research Fellows. The summer program is being coordinated by Dr. Bernard Riess, assistant professor of psychology at Hunter College, and working with him are Nicholas Collias, an instructor in zoology at the University of Wisconsin; Daniel

Lehrman, graduate student in the department of psychology at New York University and assistant in psychology at City College of New York; and Irwin Katz, assistant in psychology at Stanford University. The summer program is under the general direction of Prof. C. R. Carpenter of Pennsylvania State College.

At the end of the summer we hope to present a report on the work at the Zoological Park, and also at Jackson Hole, Wyoming, where behavior studies are being initiated under the direction of the Zoological Society.

Want to Do Some Reading?

A short bibliography of recommended books on natural history has been compiled by the Zoological Society's Department of Education, and is available to any of our Members on request. It lists 36 titles under the headings of Insects, Fishes, Reptiles and Amphibians, Birds, Mammals, General and Juvenile.

ZOO HOUSEKEEPING

Notes on a Variety of Operations

Sealion pups are not rarities, but they are easily among the most engaging youngsters in the Zoo. We have had the good fortune to have an active and healthy male born on June 10 — such a vigorous pup that he learned to swim at the age of only 13 days. A sister, Benita, born to the same parents two years ago, was two months old before she ventured into the water by herself.

* * *

A Black-necked Swan from southern South America, the first of the species imported since before the war, is to be seen on the Flamingo Pond.

SMITH COLLEGE GIVES HER HONORARY SCIENCE DEGREE



Jocelyn Crane

An honorary degree of Master of Science was conferred on Miss Jocelyn Crane of the Department of Tropical Research staff at the Smith College commencement exercises on June 16. In conferring the degree, the President of Smith said:

"Jocelyn Crane, Master of Science, an alumna of this college, research zoologist of the Department of Tropical Research of the New York Zoological Society; noted for her studies of animals in their natural environment which have taken her almost one-quarter of a mile below the surface of the ocean, to the heights of the Andes, and into the tropical jungles of Central and South America; and which have brought her, as a lecturer, writer and scientist, a wide audience in this country and other parts of this hemisphere."

Miss Crane has been a member of the Tropical Research staff for 17 years.

Ever since a fine specimen of the Philippines Monkey-eating Eagle arrived in mid-July, we have been asked whether we have to lay in a supply of monkeys to feed the bird. Actually it is doubtful whether monkeys form any considerable part of the Monkey-eating Eagle's diet even in the Philippines — certainly it is not going to get them in the Zoological Park. In fact, "Mouse-eating Eagle" might be a better name for our specimen. At first it steadfastly refused to take raw horsemeat, and in succession rejected freshly killed guineapigs and rabbits. It did, however, show an interest in dead mice — and gobbled up twelve of them in rapid succession. Eventually we hope to work the bird onto a standard diet of horsemeat.

* * *

A Cocoli Heron from South America, oldest bird in the collection, was killed on June 1 by a marauding wild Raccoon that wandered into the Park from the Bronx River. The heron came to us on April 3, 1913, and thus had been in the Zoo for thirty-four years and almost two months.

* * *

Our Elk herd is building up again. It had dwindled over the years until we had only two old cows this spring, whereupon we obtained four young cows and a bull from Jackson Hole, Wyoming. Now all four of the new cows have calved, in June and July, and we have eleven fine animals.

* * *

The Park's Construction Department has proved it is more ingenious than an African Black Rhinoceros — which is not such a simple matter as one might think. In the past year the animal has become more dangerous to the keeper, and the daily opening and closing of the big outside doors from stall to corral was a hazardous operation, since it involved entering the stall. A concrete barrier separates the stall into halves, a chain at one end being hooked or unhooked to allow the Rhino to change sides. Recently the animal learned to nuzzle the chain off its hook, which made the keeper highly vulnerable to a surprise attack. The Construction men have devised an iron ring for the end of the chain that can be slipped into a hook only when it is held in a certain position that a keeper can find quickly and easily—but which a Rhinoceros can't.



READY TO SET A NEW RECORD

In 1922 the first Duck-billed Platypus ever brought alive out of Australia lived for 47 days in the New York Zoological Park. That record was equalled on June 11 by our present three Platypuses—and they were in fine condition, showing every sign of thriving. This photograph was made on the 47th day. Holding Betty and Penelope, the two females, are left to right: David Fleay, the Australian zoologist who brought the animals to us; General Curator Lee S. Crandall of the Zoological Park; and Keeper John Blair, who is taking care of them.

Executive Secretary John Tee-Van has been reelected, for the third year, as chairman of the Museums Council of New York City.

* * *

Sudana, our large African Elephant, has somehow managed to pull a one-inch piece of skin off the end of her trunk, and since she uses the tip of the trunk very much as we use fingers, to pick up small objects, she is temporarily as handicapped as a man with a sore thumb.

A "NEW" OLD BUILDING

(Continued from Page 107)

Hoffman. A beautiful pair of Grevy Zebras, finest of the group, came to us in May, and a baby Baird's Tapir was flown from Panama later the same month. Latest addition is a hale and hearty infant Orang-utan, barely more than eighteen months old. We hope that this ingratiating mite will develop into a replica of our lamented "Mike."

Bird arrivals during the first six months of this year make an almost bewildering array — rare Eared Pheasants, brilliant Tanagers, scintillating Trogons, dainty Hummingbirds, handsome Black-necked Swans. Outstanding are the first King Penguins since 1926, a young Shoe-bill to replace our patriarchal "Jimmy" and a fine young Saddle-billed Stork. Perhaps most surprising of all are three lovely pairs of waders, secured for us by the Park Department of Salt Lake City. These are American Avocets, Long-billed Curlews and Western Willets, all hand-reared and delightfully tame.

The Reptile House, which has seen the leanest years in its history, is now making a brave show. So much new material has been received that exhibition space is filled to overflowing. Many interesting and showy arrivals are included, notably a Spiny-tailed Iguana and a Black Tree Snake, received from our collector, Charles Cordier, now in Costa Rica; also two richly colored Blood Pythons and some Barking Frogs.

So what with new interiors and new animals to people both them and older installations, the thin war years will soon be compensated. But even then, we have not yet reached our ultimate goal.

PUBLICATIONS OF INTEREST

REPTILES AND AMPHIBIANS OF THE NORTHEASTERN STATES. By Roger Conant. Zoological Society of Philadelphia, 1947. 40 pp., 117 illus. \$1.00.

Curator Roger Conant of the Philadelphia Zoological Garden has performed a useful service in compiling this account of the reptiles and amphibians of the Northeastern States. Every species is pictured — and the pictures are in most cases excellent. There are general accounts of each group, and detailed accounts of habitat, markings, food, length and the like on each species and subspecies. Since there is no other publication that attempts such a thing for all snakes, lizards, turtles, toads, frogs and salamanders of the northeastern states, the booklet meets a very real popular need.

MAMMALS OF NORTH AMERICA. By Victor H. Cahalane. The Macmillan Company, New York, 1947. 682 pp., 92 drawings by Francis L. Jaques. \$7.50.

There is a wealth of vastly interesting natural history in "Mammals of North America," for Mr. Cahalane is chief biologist of the National Park Service and he knows our native mammals from long and close observation in the field. He has discussed 94 animals with so much detail, so much pungent observation, so much humor and friendliness, that the book is good reading *as reading*, quite apart from its value for reference. There is a very long bibliography, and the pen-and-ink illustrations by Jaques are not only attractive ornaments of the pages, but far better for telling the reader what the animal looks like than photographs—which would necessarily have to be poor ones for many of the animals — would have been.

LOGBOOK FOR GRACE. By Robert Cushman Murphy. The Macmillan Company, New York, 1947. 290 pp. \$4.00.

Here is a delightful book — good natural history, exciting stories of life on a whaler thirty-five years ago, and all the charm that shines through the diary of a keen, sensitive naturalist making his first great voyage and consciously keeping a record for his young wife. Dr. Murphy of the American Museum of Natural History made the voyage to South Georgia in 1912-13 as part of the preparation for his monumental "Oceanic Birds of South America." "Logbook for Grace" is not monumental, but it is fascinating reading.

An Invitation

TO OTHER SOCIETIES

SEVERAL New York clubs and organizations have come to the Park this past spring for Dutch treat luncheons and conducted tours. We hope and think they enjoyed themselves, for they seem to want to repeat the experience.

If you are secretary or program chairman of some club or association that would enjoy an unusual outing in a beautiful place, perhaps we can help you out this fall. We suggest a week day before the weather gets too cold. On week-ends we are too busy to be properly hospitable.

Since facilities are still limited and the staff available is small, this invitation is given to Society members only and on a "first come, first served" basis. But it is a cordial invitation nonetheless, and we would enjoy hearing from you by letter or by telephone.

ENTERTAINMENT COMMITTEE,
New York Zoological Society,
630 Fifth Avenue,
New York 20, New York.
Telephone: Circle 5-5750.

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No. 5

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ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

BULLETIN OF THE NEW YORK ZOOLOGICAL SOCIETY

VOL. L

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Personalities

ANYONE who really cares about animals and who has taken the trouble to observe them patiently has made the quite exciting discovery that individuals vary from others of their kind. These variations are both physical and temperamental. To most people the temperamental variations are the most interesting. We are naturally attracted by that thing called personality.

In the wild state numerous observations have been made which prove that there are "characters" in many classes of animals, individuals who do peculiar things, quite different from the pattern of life of their fellows. In our own Zoological Park, where observation is a matter of daily routine, many animals become well-known for their idiosyncrasies. Examples are legion. One might imagine that the greatest differences would be found among the anthropoid apes. This is barely the case, although as they appear more *human*, we perhaps recognize personality differences more readily. Nobody could miss noting the temperamental differences in our four adult gibbons, whose dispositions range full-scale from trustful gentleness to aggressive ferocity. Tigers and the other "big cats" may seem alike at first glance but not so when one gets to know them. Within a few months of the birth of the three young tigers, Raniganj was the most furtive, Rajpur the most lazy and good-natured, and little Dacca the most mischievous. The strange thing is that personality variations run down through the scale to the lowlier forms. Penguins may look alike but nobody who is well acquainted with "Annie," the black-foot penguin, will ever forget his consuming curiosity and precocious ways (Annie deceived us for a while. *She* is a male.)

The other day when some of the staff were discussing these and kindred delightful subjects, mostly pertaining to mammals and birds, the head of the Aquarium Department broke in and stated that if the rest of us really wanted an education we had better stay around with him and get to know the fishes. "There's not one of them that's the same," he remarked, with some heat. "Never knew so many personalities." Fortunately, the Curator of Insects was not there just then. It is clear enough, without his evidence, that the human species has no monopoly on "odd characters."

Fairfield Osborn

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Is this a relative of ours? There is a growing conviction among zoologists that points to the Tarsier as the nearest living representative of man's lemuroid ancestor of early Tertiary time. This is a nearly life-size photograph of the Tarsier.

"First-timers" from the Philippines

By KARL P. SCHMIDT
*Chief Curator, Department of Zoology,
Chicago Natural History Museum*

A FOREWORD BY GENERAL CURATOR LEE S. CRANDALL

During the early months of 1947, there were numerous rumors, some fairly definite, to the effect that a collection of birds and mammals, possibly including Tarsiers and Monkey-eating Eagles, was being gathered in the Philippine Islands. Following a brief flurry of excitement resulting from a sketchy account in a magazine of national circulation, the project lapsed into obscurity and our hopes of securing the almost mythical Tarsier grew dim.

They certainly were at low ebb on the morning of Sunday, July 9 — the original rumors almost forgotten by this time — when a telephone call revived them. For the speaker was Lieut. Charles Wharton, who announced that he had just arrived at LaGuardia Field after a direct flight from Manila.

Early Sunday morning is not the best time for mustering the forces of the Zoological Park, but within an hour Head Keepers Scott and Schilling were at the field with a truck, and in no time at all Lieut. Wharton and his treasures were safely installed in temporary quarters in the Aquatic Bird House. Here they remained for several days before departing for the National Zoological Park in Washington, but not before we had selected two Tarsiers, two Tree Shrews, four Giant Rats of two species, and a superb Monkey-eating Eagle — all new to our collection and, with the exception of the eagle, all "first-timers" in any zoological park.

THE WEALTH of life in the tropics, and especially the tropical forest with its extraordinary evolutionary effect upon the animal life associated with it, has always formed a major interest of naturalists. Many an amateur naturalist has been confirmed in his interest and become a professional zoologist by a first visit to the tropics. It is accordingly not surprising that various scientifically trained members of the Army personnel should have elected to take their discharges in Manila, planning to engage in the collecting of museum material of various kinds for a year before returning to the United States.

Among such naturalists was Captain Harry Hoogstraal of the Sanitary Corps, Anthony deVos

of the Royal Netherlands Indies Air Force, and Lieut. Don Heyneman of the Infantry. They at first planned to use their experience, some continuing army transportation facilities, and such army surplus supplies as were available, for a year's biological exploration of the great spider-like island of Celebes to the south, for which Lieut. deVos' staff position in the Buitenzorg Museum was an invaluable asset. This plan failed on account of the necessity of repatriation of Japanese prisoners of war; deVos came to the United States to continue his education, and Hoogstraal and Heyneman, later joined by ex-Sergeant Floyd G. Werner of Ottawa, Illinois, and very lately of Okinawa, directed their plan



Notice the thin and almost skeletal hands and feet of the Tarsier, with pads at tips of fingers and toes that enable the animal to cling tightly to branches. Except for certain bats, no other mammal has such discs.

to the Philippines. Captain Hoogstraal was already well known to the Chicago Natural History Museum for his promotion of successive Mexican expeditions during his student career at the University of Illinois, and the Museum agreed to sponsor a tripartite plan for the Philippines, a year's time to be divided between the mountains of northern Luzon, high mountains near the former Japanese colony and base of Davao in Mindanao, and Palawan, the link between the Philippines and Borneo.

An independent one-man live animal collecting expedition was meanwhile organized by ex-Lieutenant Charles Wharton, who planned to obtain living specimens of some of the more remarkable Philippine animals for the United States National Zoological Park and for other

American zoological gardens. Lieut. Wharton joined forces with the Chicago Museum party in Mindanao, where their cooperation contributed to his spectacular success in obtaining considerable numbers of the remarkable "Tarsier," the principal subject of this note.

The zoological exploration of the Philippines begins essentially with the travels among the islands of Hugh Cuming in 1836 to 1840. He discovered the first of the "Giant Cloud Rats" (to be mentioned below), and called attention to the richness of the fauna in mammalian types confined to the Philippines — the *endemic fauna*. The English zoological collector John Whitehead, whose explorations of Mt. Kina Balu in North Borneo in the late 'Eighties had been notable, addressed himself to the attack on the high

mountains of northern Luzon, especially Mt. Data, in the 'Nineties, and again achieved a spectacular zoological success; a whole series of remarkable rodents became known as result of his work. It is a sad footnote to his career to add that Whitehead lost his life from malaria in the course of his subsequent explorations in Hainan.

American interest in Philippine zoology in general and in its birds and mammals in particular, rose sharply with our acquisition of the islands in 1898. Major Edgar A. Mearns, already known for his competent zoological collecting on the Mexican border, matched Whitehead's Luzon success with similar and perhaps even more important discoveries in Mindanao, the great southern island, working especially on Mt. Apo, which rises to a height of nearly 10,000 feet. In the next decades Edward H. Taylor followed Mearns' early success with a general survey and summary

of the Philippine mammals, including much new material obtained by himself. Taylor's "Mammals of the Philippine Islands" was finished in 1926, but not published until 1934.

The new expeditions of 1946-47 by the Chicago Natural History Museum party and Lieu-



The Philippine Tree Shrew is a squirrel-like animal in appearance but zoologists have recently classified it in the Order Primates — the Order that includes the Lemurs, Monkeys, Anthropoid Apes and Man. Thus the Tree Shrew, too, seems to be a relative of ours, although a distant one.



The Bushy-tailed Giant Rat (Crateromys) is ordinarily black, but the series Lt. Wharton brought back showed variation.

tenant Wharton have the merit of producing excellent series of many species hitherto known only from single specimens, and many of the forms known only from skins and skulls are now represented by series of bodies embalmed for dissection, to which the living specimens in zoos will also ultimately contribute.

Strangest creature of all is the little Tarsier, apparently exhibited alive for the first time in America. This tiny creature is a compendium of evolutionary interest, and a neat combination of the two main interests of comparative anatomy. First, it is an ancient type, with quite abundant extinct relatives, represented by fossils from North America and Europe of Paleocene and Eocene age. The growing conviction that the ancestry of the anthropoids, including man, is quite separate from that of the monkeys proper points to the Tarsier as the nearest living representative of our lemuroid ancestor of early Tertiary time. Anatomical comparisons in the interests of such studies of phylogeny are the subject of most classical studies in comparative anatomy.

But *Tarsius*, even if close to the early ancestry of man himself, has had an equally long independent evolution of its own; it lives in the tropical



Another one of the so-called "Cloud Rats" of the Philippines is Cuming's Giant Rat—a strange-looking rodent that is little known except to zoologists. We now have a pair of them.

forest, where animal after animal has become remarkably adjusted to life in the trees; and the resulting adaptations of *Tarsius*, to leaping locomotion, to life in the trees, and to nocturnal habits are so remarkable that they supply the best of material for another kind of comparative anatomy — the anatomy of function, of adaptive devices, a new anatomy that requires alternate observation of the behavior of the living animal and examination of its anatomical structure. The old anatomy focussed precisely on those structures that are without external function, as relationship can be read from their lack of modification; the new anatomy attends to the opposite structures, precisely to those that are modified; and as such studies extend to analogies from different animals with structures used for the same purpose, however differently derived, this field of study is immensely interesting and affords much insight into a wide range of biological problems.

Much more spectacular than some of the obscure characters that ally *Tarsius* to man are the peculiar structural characters. *Tarsius* is bipedal, but a leaper, and has the characteristic modification of the limbs of leaping animals — the development of an elongate tarsus (which peculiarity gives *Tarsius* its name), by great elongation of two of the tarsal bones (the astragalus and calcaneus). The capacity for leaping is reported from the field to be astonishing for so small an animal; a suitable limb several feet distant may be reached by a single leap.

It may be doubted if the bipedal leaping habit was originally arboreal, as the familiar leaping types, Kangaroos, Kangaroo Rats (and of course Rat-kangaroos!), Jumping Mice, Jerboas, Elephant Shrews, etc., are characteristically terrestrial forms. The Tree-kangaroos are so obviously ill-adapted to arboreal life that they are clearly making the best of an inherited type of

structure ill suited to the forest. *Tarsius*, however, is extraordinarily *well* adapted to jumping among the branches of trees by precisely the same type of adjustment that makes efficient tree-frogs and tree geckos, namely clinging expansions of the toes and fingers. Certain rare bats have specialized sucking discs (of a quite different type) by which they cling to a day-time support, otherwise no mammal other than *Tarsius* has such discs, and in *Tarsius* they are extraordinarily tree-frog-like, with extra mobility gained by the insertion of a short joint just before the disc.

The appearance of *Tarsius* is dominated by the extremely large eyes, eyes relatively much the largest for any mammalian type. It is not only external appearance that is dominated by the enlarged eyes; the eyeballs are so large that the whole skull is extremely modified. The eyes are directed forward, the skull between the eyes is



Largest of Philippine birds is the Monkey-eating Eagle, only a very few of which have ever been exhibited before.

reduced to a flat plate, and the nasal apparatus seems to be correspondingly reduced. The eyes seem to lack mobility, but this is made up for by an extreme capacity for rotating the neck — the head can actually be turned through more than 180 degrees while the body remains immobile. The ears are well developed and obviously extremely sensitive — the external ear is constantly being turned to catch some trifling sound.

The great eyes, with wonderfully expansible circular iris, and to only slightly less degree the great development of the ear, are characteristic of nocturnal animals. This has an interesting evolutionary and ecological significance, for all the other Asiatic and African Lemurs are as nocturnal as *Tarsius*, sleeping by day and abroad only at night — like the Slow Loris or the Bush Baby. Some of the Madagascan Lemurs, on the other hand, are active by day. It is difficult to escape the conclusion that it is the large scale evolutionary effect of "biotic pressure" (the sum of enemies and competition and other external factors) that has driven primitive types like these Lemurs to arboreal and nocturnal habits. The great expansion of the Lemur group in Madagascar, on this view, is a reflection of the relative absence of carnivorous enemies.

Tarsiers have always been thought rare, and the Wharton-Hoogstraal collection is the first to contain any considerable series. Like many other creatures of limited range and special habits and habitat, its supposed rarity turns out to be quite mythical when its true habitat is made accessible. In this case, the discovery of Tarsiers in numbers was the result of land clearing operations for a manila hemp plantation — clearing employing a gang of Filipinos and making a clean sweep of low second growth forest. Concern was felt in some quarters as to the numbers of Tarsiers taken by the two expeditions, but it is evident that vastly greater destruction of Tarsiers has taken place in the past in making the great plantations of the Davao region, and that similar destruction will continue with the development of manila hemp plantations in Mindanao.

The great numbers of Tarsiers taken in the area being cleared plainly indicate an "ecological saturation" of this habitat, and it may be inferred that the adjacent forest must have been equally filled to its full carrying capacity with Tarsiers.

Thus rescuing the Tarsiers from the cut-over area and liberating them elsewhere could not have saved them. It is a basic rule that the destruction of a whole type of habitat is the most serious crime against conservation, and that conversely, the best interests of conservation very frequently are only to be served by the establishment of National Parks and "Nature Monuments" and other wild-life refuges.

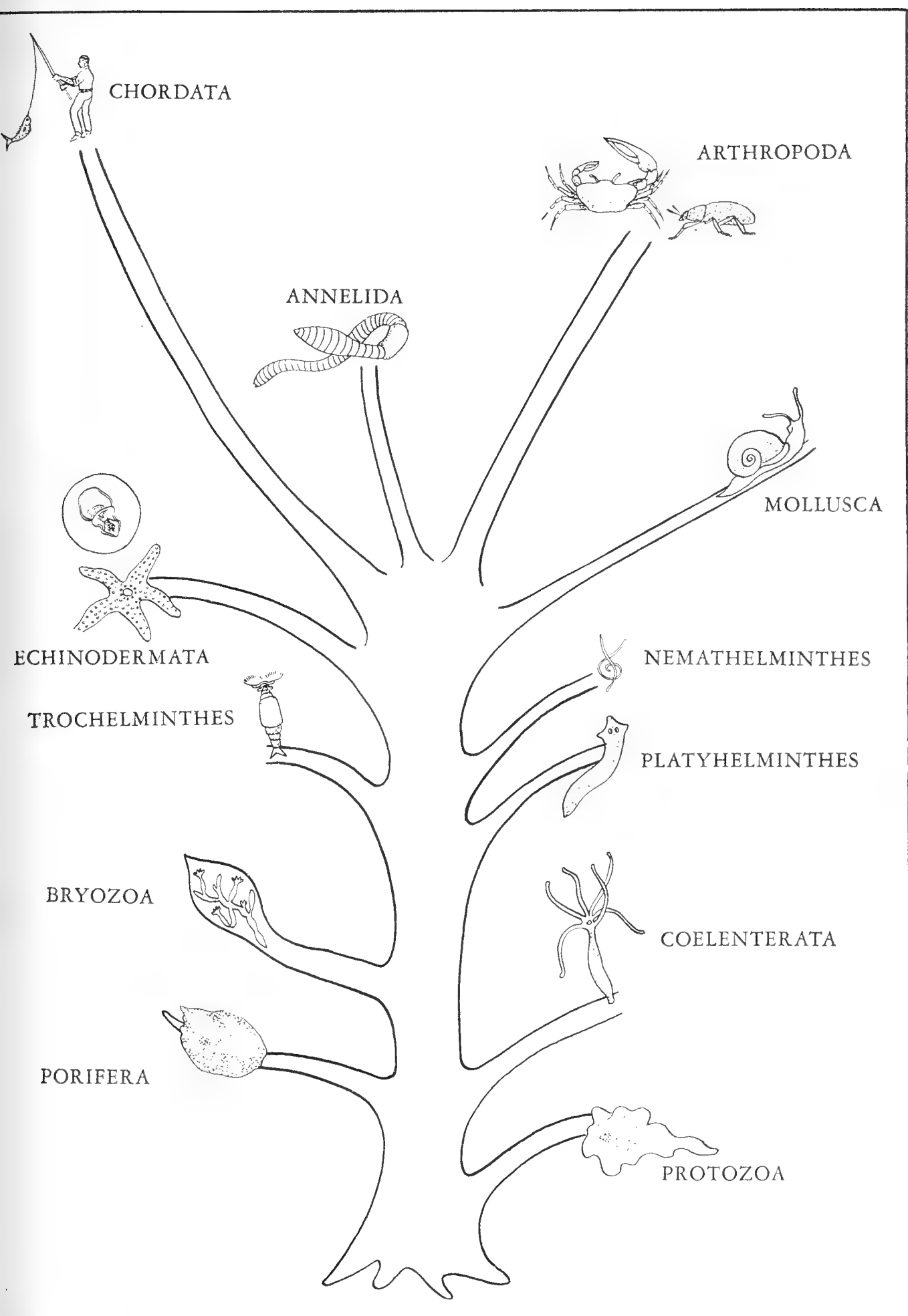
It may be a reasonable suggestion to the new Philippine Nation to establish some such national wild-life reserves, more particularly in regions subject to commercial plantation exploitation.

In its native forest the food of the Tarsier is rather that of a carnivore than an insectivore. Lizards, especially as they sleep at night, appear to be preyed upon. In captivity mice and lizards are accepted eagerly by some specimens. Others, however, will take only insects or even only mealworms, and insects undoubtedly form a fair proportion of the Tarsier's food in nature. Tarsiers produce only a single young at a birth, born well developed and with eyes open, a small replica of its parents.

Living Tarsiers are found in the larger East Indian islands from Sumatra to Celebes. The Philippine species appear to be three, and the form obtained by Lieutenant Wharton and by the Hoogstraal party is *Tarsius carbonarius*, hitherto known only from the type. The systematic arrangement of the Tarsiers at the species and subspecies level, as a natural result of the fewness of specimens available for study, is evidently in a most unsatisfactory state. Even the large series of *carbonarius* now available will need to be supplemented by specimens from other islands before a sound classification can be established.

The Philippine Tree Shrew (*Urogale everetti*) has been known since 1892 and less a rarity than the Tarsier, but it seems to have been collected only twice before. The transfer of the Tree Shrew group from the Order Insectivora (the Shrews, Moles, Hedgehogs) to an independent Order Menotyphla, and most recently to the Order Primates (Lemurs, Monkeys and Anthropoids) is an extremely important change in the classification of mammals. It represents a review of the total of affinities of the group, in the light of fossil as well as living forms. The living

(Continued on page 165)



A Zoo Within the Zoo

By WILLIAM BEEBE

You'll be surprised by the variety of wild life we exhibit all over the Park — completely at liberty, too.

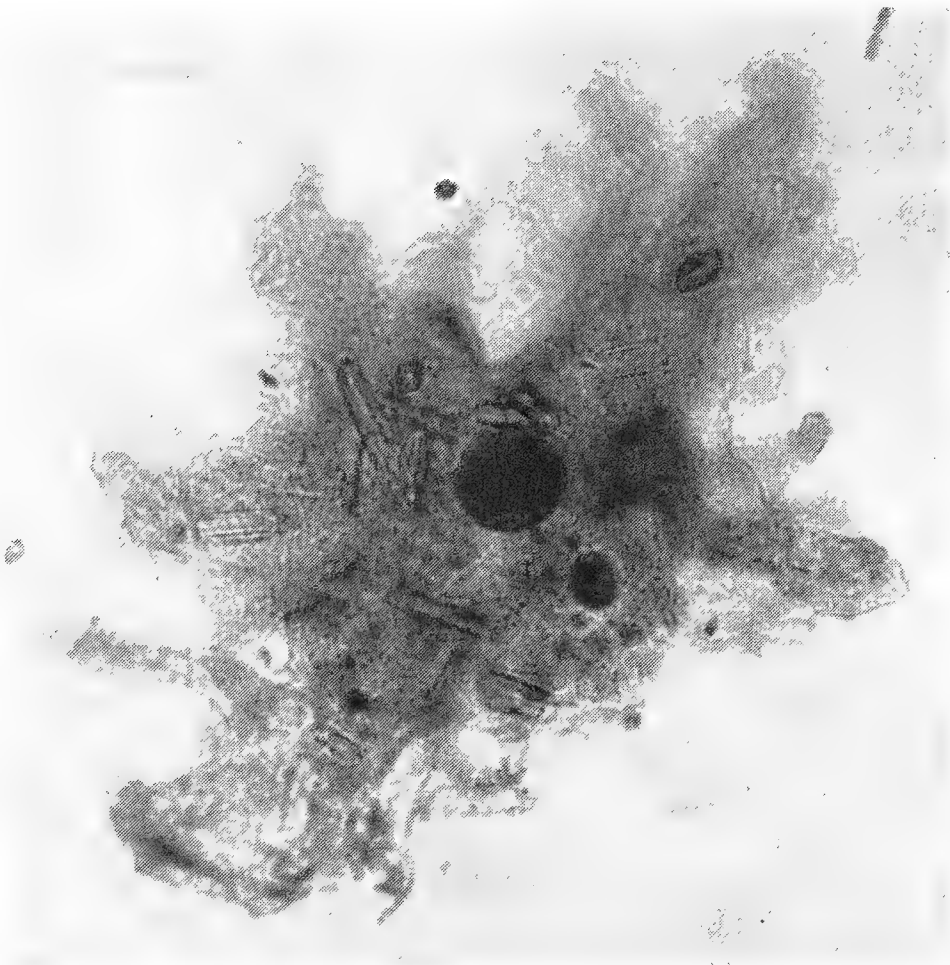
EVEN the most casual observer walking through our Zoological Park is aware that wild animal life is present other than the creatures living in the houses, behind cage bars or across open moats. Squirrels come to feed from the hand, gulls and sparrows fly overhead, now and then the head of a turtle is visible above the water of a pond or a garter snake glides through the grass. In the spring bull frogs and peepers lift their voices from the swamps, and we can see small fish nibbling at floating crumbs in the Bronx River. In a word, in a day, we may see every class of back-boned animals living on the earth, and sharing with us our own park.

Evolutionists divide all living creatures into a dozen to twenty great divisions which are called Phyla, and are the larger branches on the Tree of Life. In this article we will accept the lesser

number. Incidentally these provide a terrific shock for the human ego, for while various kinds of worms require four phyla, man, monkeys, whales, opossums, birds, snakes, frogs and fishes are all included in a single one.

Years ago when I was building up the bird collection in the Zoo I spent some spare time messing about in the swamps and ponds and discovered that every one of the twelve great groups (with a single exception) lives and thrives within our boundary fence. The one absent Phylum is called Echinodermata, the spiny-skinned starfishes and urchins. These are found only in salt water, and to complete the Animal Kingdom we must drive due east from the Zoo for two miles, and there near shore in Pelham Bay we will find small starfishes.

The other eleven groups which inhabit the

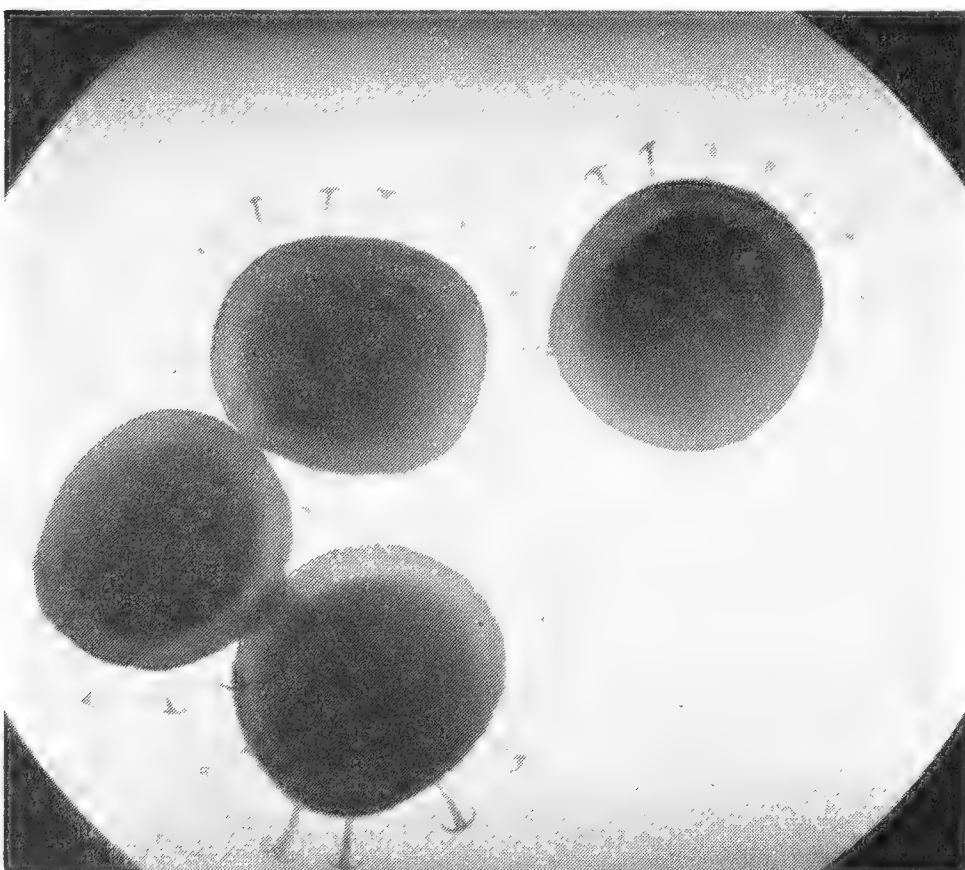


The Amoeba is a formless, one-celled bit of life that belongs to Phylum Protozoa (1).

Zoo are “on exhibition” only when we search for them. A tumblerful of mud and decayed leaves from swamp or pond will provide us with several.

First comes Protozoa, or one-cell animals.

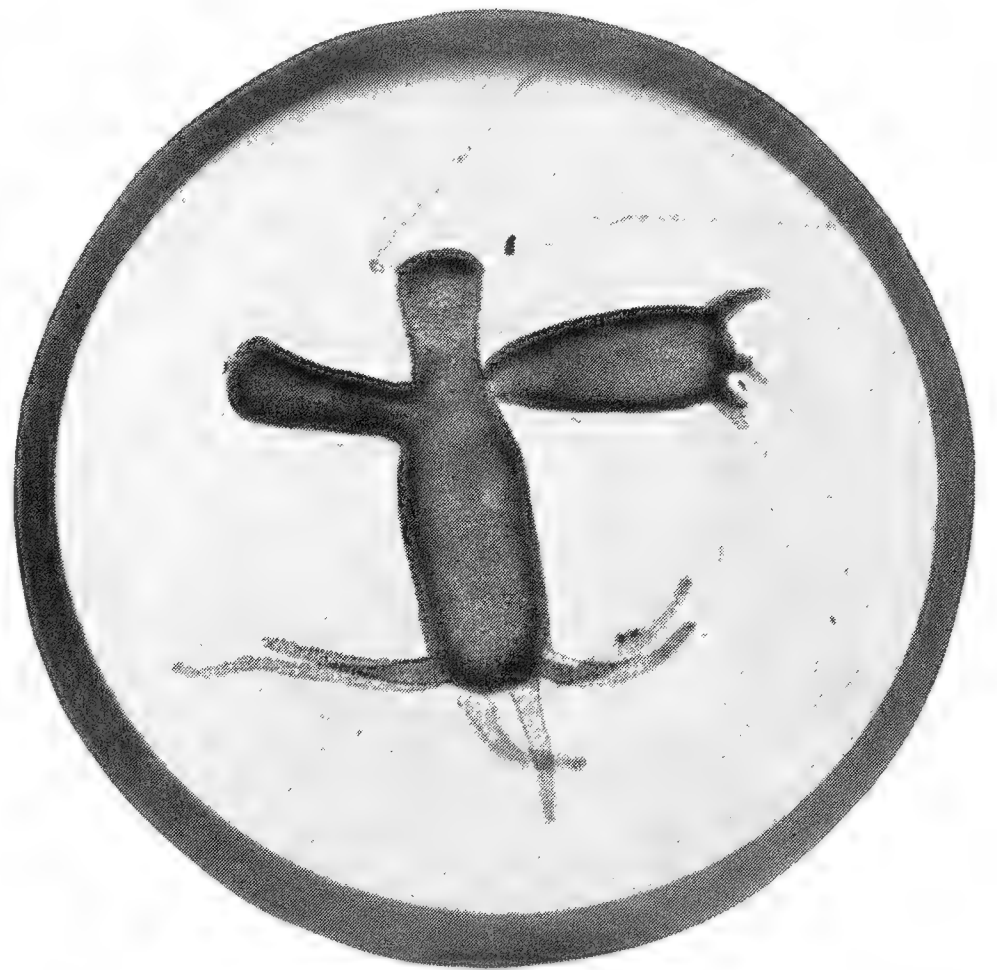
Next to man the Amoeba is probably the most famous of living beings, for it mirrors to ourselves the living, naked, single cell typical of our first ancestor, slightly removed from lifeless matter. It also emphasizes that each of us and every individual animal can boast only two half cells at the commencement of life. To be sure, there is



Winter eggs or statoblasts of a fresh-water sponge are classed in Phylum Porifera (2).

a temporal difference between the two events of more than a billion years, and in your case and mine, three score years and ten. However, the salutary deletion of any undue conceit is quite as effective.

This Amoeba, this blob of jelly, is considerably



Fresh-water Hydra with two buds—representing the Phylum Coelenterata, our No. 3.

smaller than the period at the end of this sentence, yet if we watch it long enough under our microscope we can see it move, feed, excrete, breathe and reproduce. Only the capacity to think appears to separate man from amoeba, and there are times when even this distinction appears disquietingly tenuous. The various activities of an amoeba are especially amazing when we consider the relative homogeneousness of its substance, a mobile single drop of life any part of which may in turn function as head, tail, limb, mouth, stomach and lung—all to vanish again when the temporary need passes.

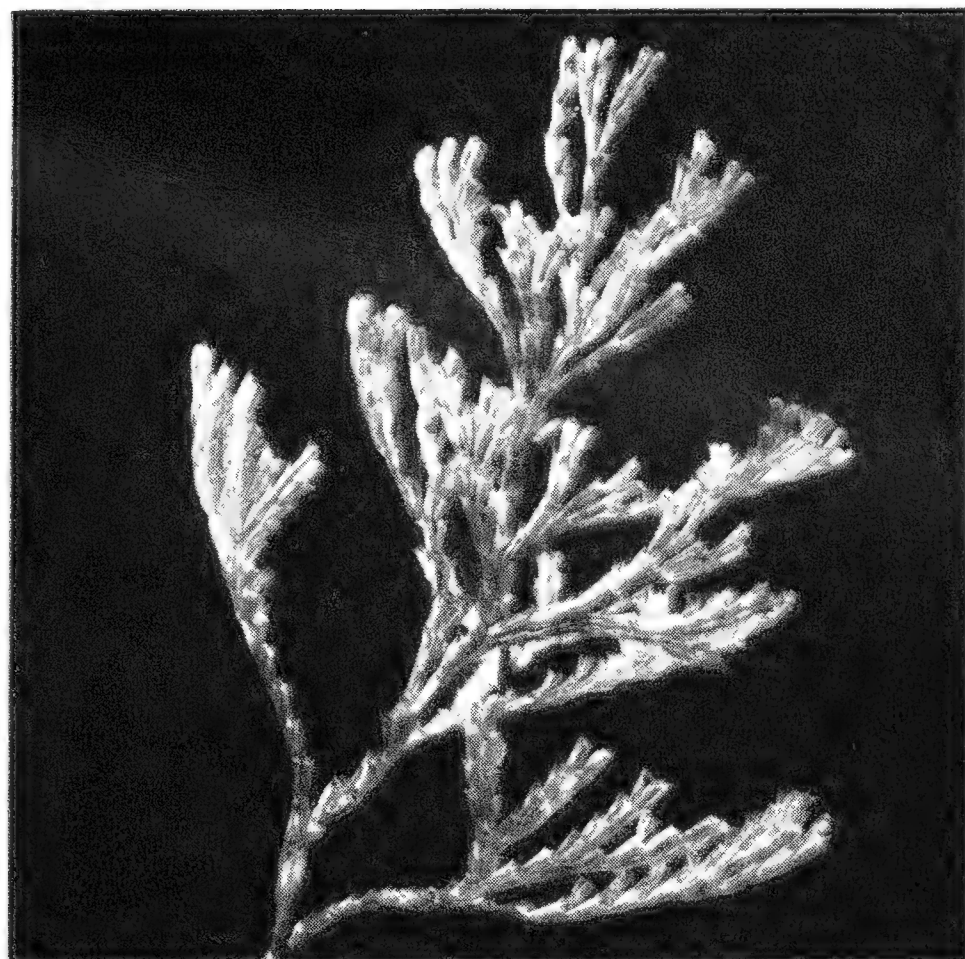
Protozoans are such lowly creatures that some barely deserve the name, for they are really plants in the sunlight, and animals only at night. Other single-cells are housed in elegant and roccoco shells, and while some live today inconspicuously in the waters of the Zoo, others in past ages have piled up to make chalk cliffs, or dissolved into subterranean lakes of petroleum. The most interesting protozoa are those which cling uncertainly to one another, as if pretending

to be creatures of a higher order. Some of man's worst enemies are one-cells, such as the minute bits of life causing sleeping sickness, pyorrhea and malaria. On the other hand, a host of these animalcules, all invisible, are fighting man's physical battles so stoutly that without their aid his very existence might be threatened.

So toward the Phylum Protozoa we may feel the varying emotions of fear, curiosity, wonder, admiration, gratitude and amazement, even awe, but never indifference. That would only bring us down again to the mental level of gran'ther Amoeba.

Phylum Number Two consists of Sponges and it is surprising that in the brooks and ponds of our Zoo sponges thrive, complete with fibrous skeleton, spicules and everything, except size, possessed by living bath sponges from the sea. In a fresh-water sponge it is the close clinging together of slightly differentiated cells to form a distinct individual animal, which raises it above the Protozoa.

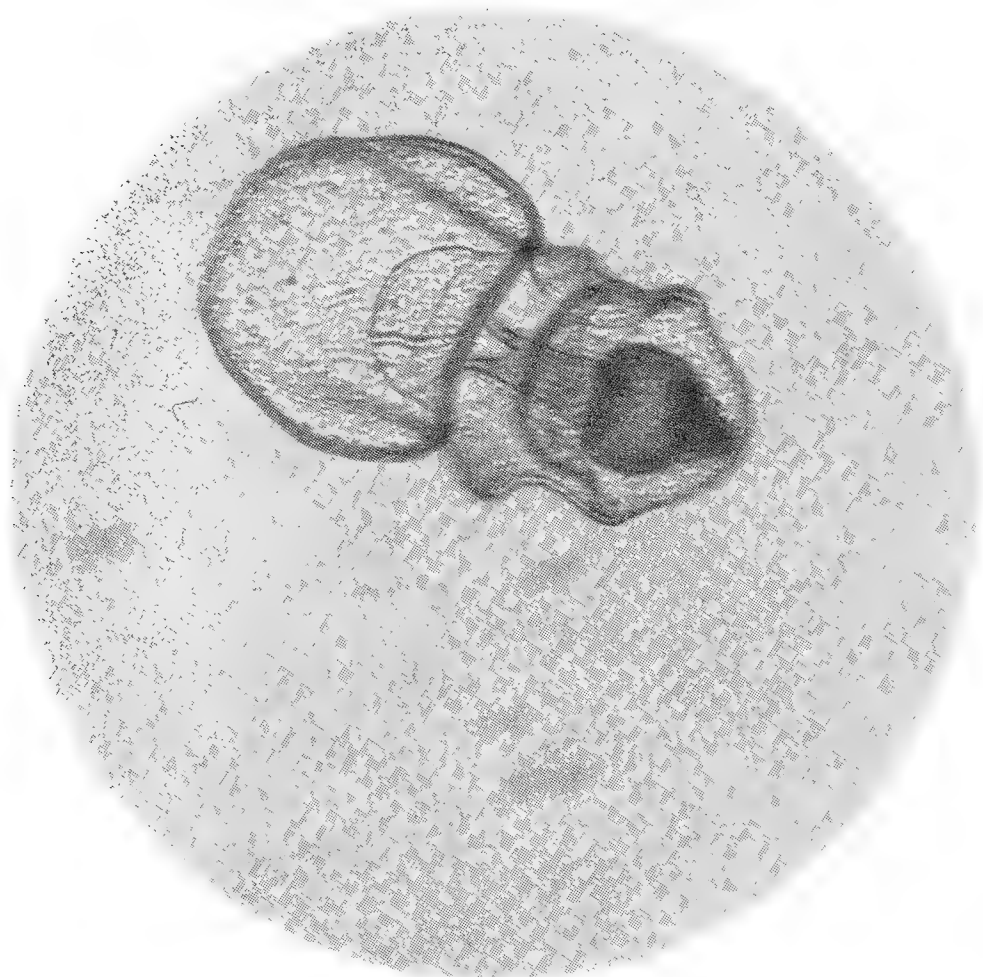
Phylum Three is as unexpected in our Zoo as a sponge, for it includes jellyfish, sea anemones



American Museum of Natural History Photo

A detail of one of the curious moss-animals that belong to the Phylum Bryozoa (5).

peared in a pond in Staten Island, and in the tanks of our Aquarium. The delicate, little swimming jellies are only half an inch across, but their name is *Craspediscus*. We do not need this jelly to make this phylum a Zoo one, because a thimbleful of pond debris may contain many little Hydras, which are only coral polyps gone naked, individual and acrobatic. These pleasing, active little beings with their two definite layers of cells and permanent mouth, are fun to watch

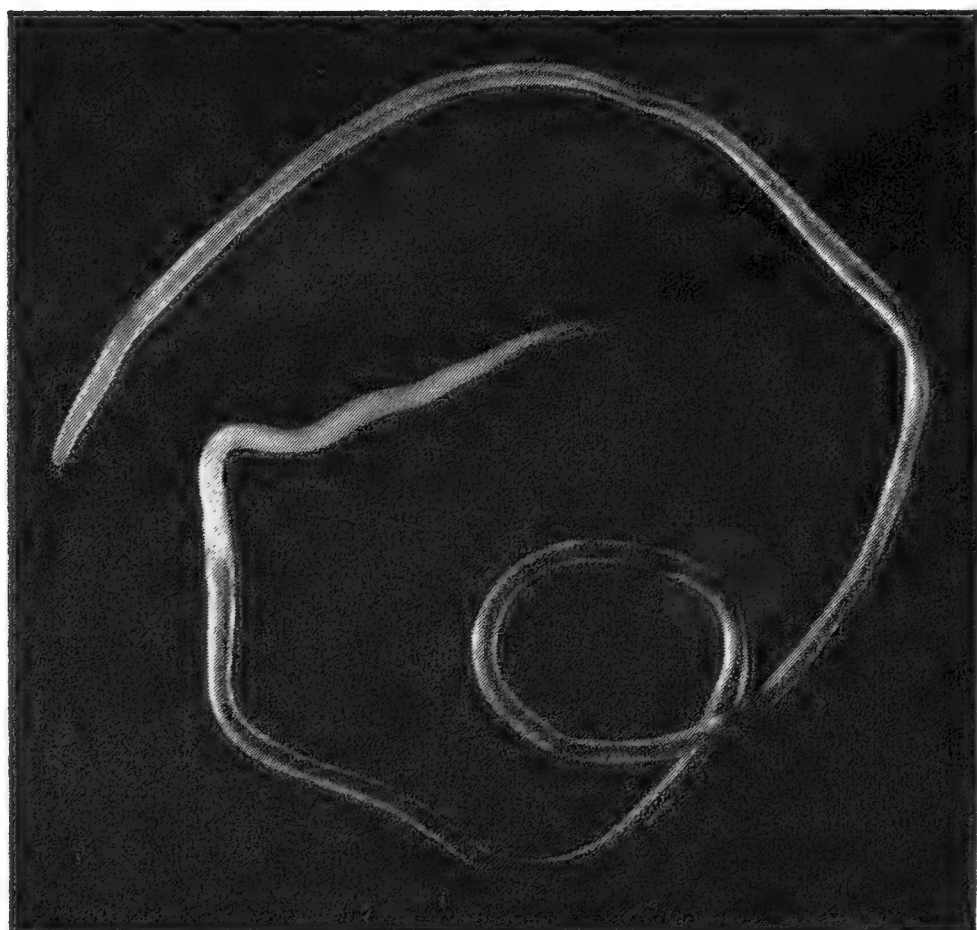


This is a free-swimming larva of a Starfish, example of Phylum Echinodermata (4).

and coral polyps. As in some other groups a few species have found life possible and pleasant in fresh-water, and there is a tiny, but beautiful and rare jellyfish which at any time may suddenly be found in our ponds. It has already ap-



The harmless Flatworm has dangerous relatives. It is in Phylum Platyhelminthes (6).



Roundworms of our Zoo Within a Zoo are representatives of Phylum Nematoda (7).

as they loop along or briskly somersault across our field of vision. It is a not unfelicitous thought that hydras may possibly be somewhere near our main ancestral line, on the way up from amoebas.

Phylum Four includes the spiny-skinned Starfishes and Sea-urchins which, alas, is the only group of this magnitude to be absent from the Zoo. Next in our animal review there appears Phylum Five, the Bryozoa or Moss-animals.



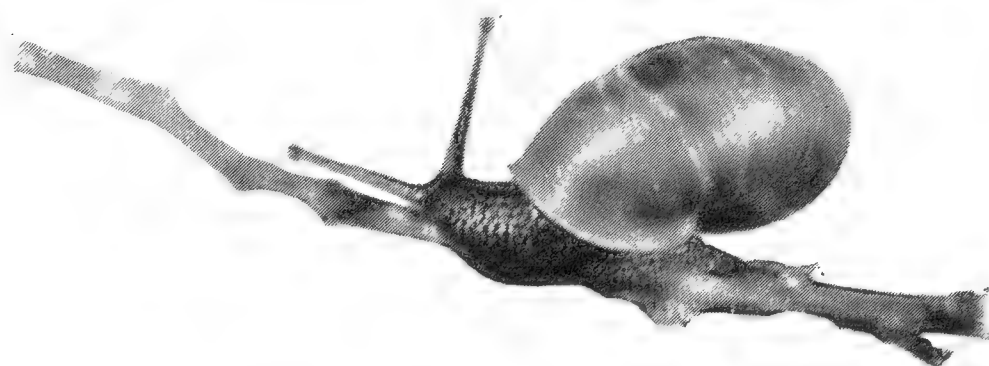
American Museum of Natural History Photo

This Rotifer belongs to the group of Wheelworms that are in the Phylum Rotifera (8).

These bear considerable resemblance to corals, the individuals living in colonies which encrust leaves and sticks with a moss or lichen-like covering. Under the microscope they are graceful and elegant in form and motion. I have found branched colonies of *Plumatella* in Cope Lake, reminiscent, on a miniature scale, of corals growing forty feet down off Bermuda.

The next three phyla include worms of many and varied kinds and appearances and it is a relief to be fairly certain that the first three are probably side branches and in no sense First Families in our genealogy. (You will find their special names at the end of this article.)

Phylum Number Six embraces the Flatworms which may be found creeping about on the under side of water-soaked leaves, looking like minute tissue-thin slugs. Their heads are mere



Familiar to most of us is the Land Snail, chosen to represent Phylum Mollusca (9).

caricatures, for their mouths are far down toward the tail. They are harmless, and man and flatworms go their way together on earth in peace. However, these worms have near relations which are terrible afflictions of our race, including such organisms as liver flukes and tapeworms. The next group, Number Seven, is that of Roundworms, most of which are minute, looking like white, coiled bits of thread. In the Zoo they live harmlessly in the mud and water, and millions of them in the earth. Elsewhere, and especially in the tropics, they are dangerous parasites which cause the diseases of hookworm, trichinosis and filariasis. The members of Phylum Eight are much more pleasant creatures, which we may call Wheelworms or Rotifers. They are very abundant and active and go shooting across a drop of water by means of what looks like a pair of revolving wheels at the front of their body. This is an optical illusion caused by rapidly moving short hairs. This is also a consoling Phylum in that it does us no harm. One of many interesting

intimacies concerning rotifers is that in some species the males are extremely small and quite unable to take nourishment, while in other incredible groups this sex seems completely unnecessary and wholly non-existent.

Phylum Nine is the first of the larger divisions, the Soft Ones or Mollusca, which have bypassed the line of direct evolution to ourselves. In this group are the thousands of kinds of snails, slugs and octopuses which range from mountain tops to the depths of the sea. Within our acreage we possess both of the great classes, bivalves or mussels in the Bronx River, and univalves or snails on land. We may remark that there is always the possibility of pearls being found in the former.

To most of us the word WORM means the



The Wolf Spider, not as big and bad as its name, stands for Phylum Arthropoda (11).



The common garden Earthworm, favorite Platypus food, is in Phylum Annelida (10).

common Earth or Angleworm, and together with Leeches it belongs to Phylum Ten. Both of these groups are found in the Zoo outside of cages. Earthworms are among the greatest friends of mankind, plowing and mixing the soil of our fields when we are too lazy or too ignorant to do it thoroughly. We ungraciously reciprocate by impaling the unfortunate angleworms on hooks as bait for fish. We can hardly think of these worms as beautiful, but cousins of theirs which live in the sea are as exquisite, colorful and graceful as flowers. They are also much more

exciting, for they wave their petal arms about and can bud, blossom and vanish within a few seconds' time.

Earthworms are small and inconspicuous, living underground and seldom seen. Yet these lowly creatures represent a very real and significant advance, especially in the development of successive segments of the body which persists throughout all higher creatures (even indirectly in ourselves, as in our series of ribs).



A Gray Squirrel (like a man) is a backboned animal, and thus in Phylum Chordata (12).

Another important step is the presence of a ladder-like series of nerve ganglions. Whatever may be our 1947 reaction toward the humble earthworm, we cannot escape the fact that some five hundred millions of years ago, the ultimate coming of mankind may have depended upon the success in life of some worm-like creature or its ancestor. This being, in turn, had at least the opportunity of looking back with mixed feelings upon his forebear, the amoeba, in still more distant times. So when next you encounter an angleworm creeping across your path, help him on his way, and for the amelioration of any overweening conceit, recite: "There, but for the grace of God, goes a member of the New York Zoological Society."

Of an unbroken ascent from amoeba to ourselves there is not the slightest doubt, but the exact route is still so dim that the most recently accepted theory side-tracks the worms and invokes the minute free-swimming young of starfish ancestors which rowed themselves through pre-Cambrian seas some five hundred millions of years ago.

The Eleventh Phylum is Arthropoda, the Joint-legged Animals, and its multitude of members seems wholly out of all proportion when compared with that of preceding groups. The three-quarters of a million species exceed those of all plants and all other living animals. This group includes the lobsters, shrimps, crabs and barnacles, centipedes and millipedes besides scorpions, mites and spiders, butterflies, beetles, flies, bees and all other insects. In size, abundance and diversity these completely overshadow the humble angleworms, but the pattern of fundamental step, up the tree of life, is relatively equal to that in the lesser group. This advance is most important, for we find here the first appearance of a real head with sense organs, and a hint of a brain-like enlargement of the anterior rungs of the ladder ganglions. The external skeleton and other characters, however, rule out all possibility of a direct line to ourselves.

Our Zoo is rich in wild Arthropods. Within a few minutes we could doubtless collect a pillbug, a millipede, a spider and a beetle and thus complete the tale of Classes. And as to Insects, we know that every one of the twenty-three Orders, from spring-tails to wasps, makes its home here.

Last in our march of life comes Phylum Twelve, Chordata or Vertebrates, all animals with backbones. Here are five principal classes: fishes, frogs and salamanders, reptiles, birds and mammals, and we have already shown that all five are to be found living wild in the Zoo. We human beings rather fancy ourselves as Lords of Creation, as the topmost twigs on the tree of life, and it is rather a shock to have our entire earthly population reduced to a single genus — *Homo*, which is the ninth diminishing division from the Phylum of vertebrates.

The ignorance of the general public is profound as to all the great divisions of animal life except the last two in our list. In the future the Zoological Society is hoping to show by means of magnifying glasses, microscopes and projections, some of these lesser living creatures. They make up for their small size by their vital importance as suggesting links in the chain which stretches up from Amoeba to Man.

PHYLA: THE GREAT DIVISIONS OF THE ANIMAL KINGDOM

In his "Animals Without Backbones" Ralph Buchsbaum recognizes the following twenty-one phyla, an extreme of differentiation. In this list, man's phylum of the Chordata occupies a still more humble perch upon the Tree of Life; being one to 21 as to number of phyla, with a worm handicap of 12 to one. My conservative dozen phyla are numbered.

- Protozoa — One-celled Animals (1)
- Porifera — Sponges (2)
- Coelenterata — Two-layered Animals (3)
- Ctenophora — Comb Jellies
- Platyhelminthes — Flatworms (6)
- Nemertea — Proboscis Worms
- Nematoda — Roundworms (7)
- Nematomorpha — Threadworms
- Acanthocephala — Spiny-headed Worms
- Rotifera — Wheelworms (8)
- Gastrotricha — Spiny Worms
- Bryozoa — Moss Animals (5)
- Brachiopoda — Lamp Shells
- Phoronidea — Worms of Phoronis
- Chaetognatha — Arrow Worms
- Mollusca — Snails, etc. (9)
- Annelida — Earthworms, etc. (10)
- Onychophora — Peripatus
- Arthropoda — Joint-legged Animals (11)
- Echinodermata — Starfish, etc. (4)



1 *Spines bristling, the Echidna waddles away from Head Keeper Schilling at the beginning of the excavation experiment.*

Digger from Down Under

THE text-books say the Australian Echidna or Spiny Anteater is Antaeus-like; that it hooks its spade-like nails into the ground and clings, and that it can actually dig itself out of sight in a very few minutes.

Undeniably the Echidna has powerful scooping nails — equally undeniably, we have an Echidna. Why not test the story?

On a summer afternoon Head Keeper Gus Schilling of the Mammal Department put on

his heaviest gloves (to protect himself from the spines) and carried the Echidna out of doors. There was a patch of bare earth conveniently nearby, a path that had been trodden hard by generations of keepers. It would be a severe test.

Schilling let go of the prickly package. The Echidna scurried about for two minutes, then began to dig. It was out of sight, completely, in exactly nine minutes. It dug easily.

Digging it up wasn't easy!



2 For two minutes, the Digger from Down Under explored the area, moving slowly.



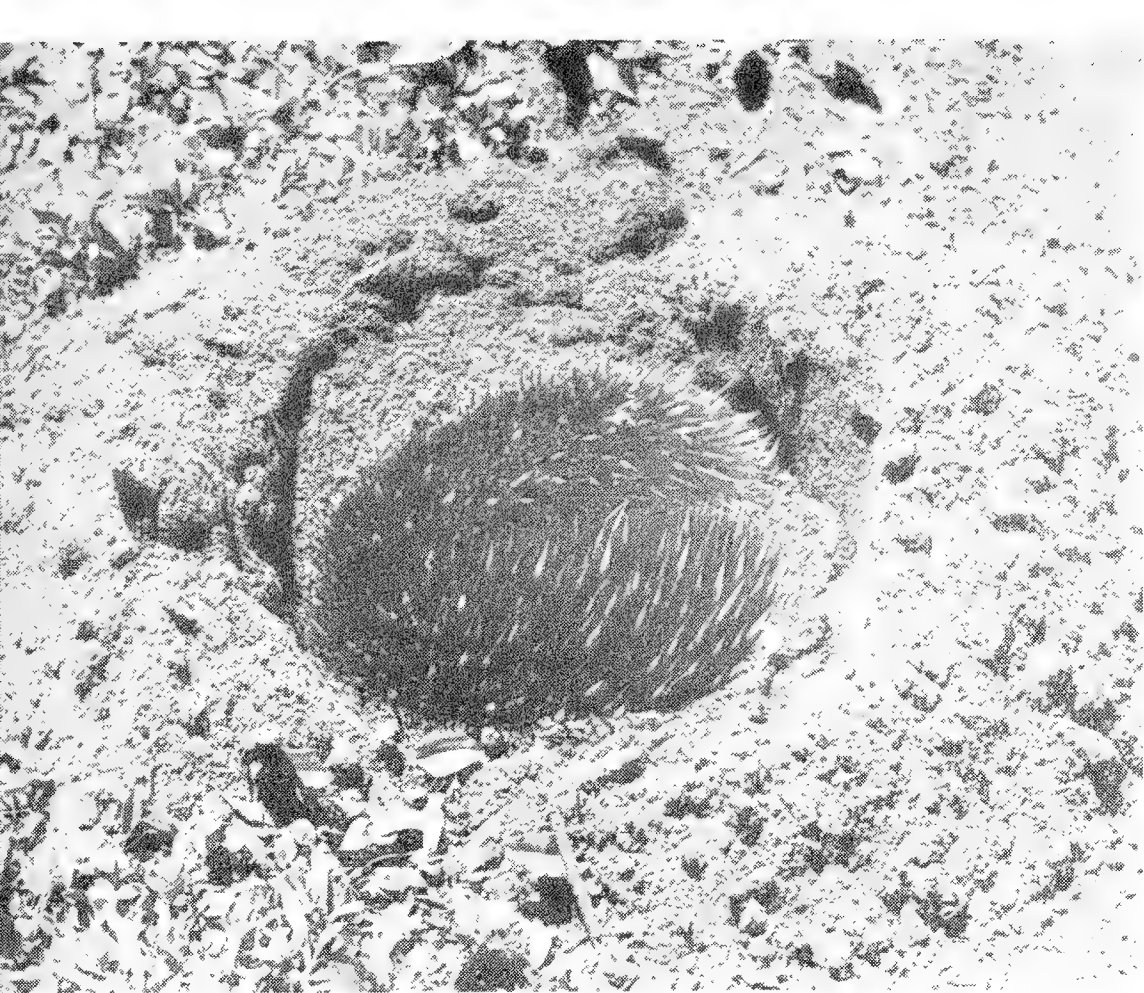
3 Then with steady and purposeful sweeps of its foreclaws, the Digger started to sink



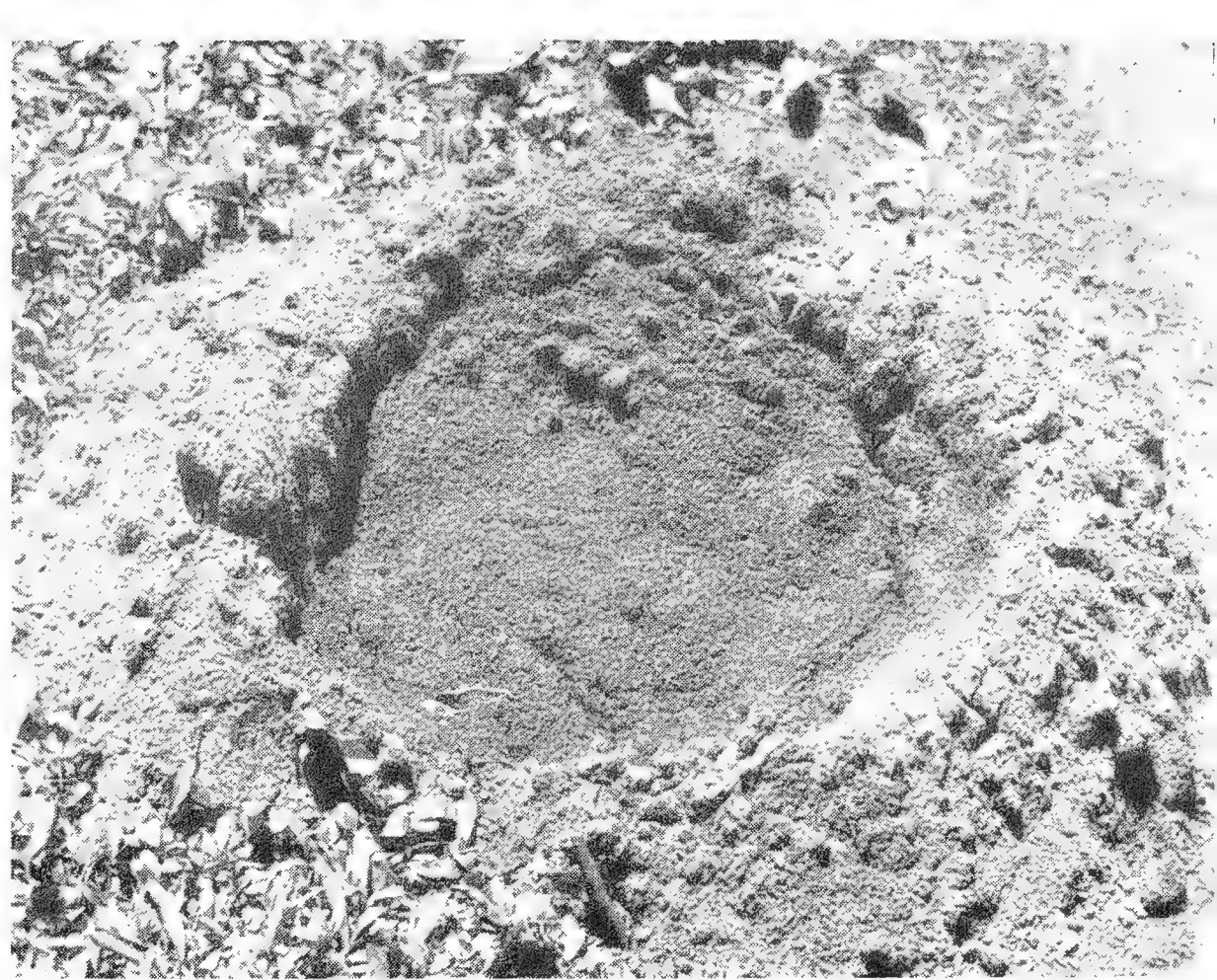
6 Inserting his spade carefully, Head Keeper Schilling began the job of retrieving the entirely-buried Anteater.



7 The books were right about the anteater's digging power, and Schilling h



4 Dirt began to boil up from around the animal; its defensive spines remained erect.



5 All under, in exactly nine minutes from the time the Echidna started to scratch the earth.



na really does cling to the
o deep and pry up forcibly.



8 The Head Keeper, at least, was much the worse for wear
by this time, but the Echidna seems to have enjoyed himself.

Okapi Experiences

By WILLIAM BRIDGES

ZOOLOGISTS have known for a long time that the Okapi is not a rare animal in certain parts of the Belgian Congo. It is true that it was one of the last great mammals to be discovered¹ and that our knowledge of it dates only from 1901,² but those facts are explained by the nature of the animal's habitat—the once trackless, once almost impenetrable Ituri forest in the north-eastern Congo. As trade and civil administration, roads and naturalists, spread throughout the Congo, our knowledge of the Okapi expanded rapidly and even if comparatively few of these only living relatives of the Giraffe have been seen in the zoological gardens of the world, they have certainly not been rare in captivity in the Congo itself.

Brother Joseph Hutsebaut of the Mission of the Premonstrant Fathers at Buta, the "Okapi man" who reared our own Okapi, astonished me last year by mentioning that at one time, in 1940 and 1941, there were *twelve* adult Okapis in captivity at Stanleyville, and one animal was born there. By means of the clue he provided, I obtained from Dr. H. R. F. Colbach, the chief veterinary officer of the Belgian Congo, a report that had been made on these thirteen animals by Dr. T. Els, the provincial veterinary officer.

When the report was made in March of 1942, ten of the thirteen Okapis were dead, five of them as a result of worm infestations and five by accidental causes — injuries, indigestions, panic and the like. One animal had been sent to the United States and died en route; the other two subsequently succumbed in Stanleyville from causes which I did not learn.

It was not a happy beginning of an experi-

Just before the war the Belgian Congo Government captured twelve of these shy, delicate animals — and learned a great deal.

ment of rearing Okapis in captivity, but it did show how *not* to transport, confine and feed them. The whole undertaking was, of course, complicated by the fact that war broke out after the experiment started with the capture of the first animal in January, 1939. I gathered from the comments of people who had been in Stanleyville at the time that they were confined in extremely small quarters, could not be adequately supervised, and that Stanleyville in the early days of the war was certainly not the ideal setting for an attempt to breed shy animals.

Dr. Els' report on the causes of death and his observations at autopsy are of some medical and veterinary importance, but his notes on acclimatization and on the development of the baby Okapi are of general interest.

"Wild and shy at the beginning, the Okapis quickly adapted themselves to their new life," Dr. Els wrote. "They readily allowed themselves to be approached by strangers as well as their keepers; some would permit petting and stroking. The males were less docile than the females. At the birth of the baby, the mother allowed us to approach, and later when we were taking care of the young one she would come running and huffing, but without attacking. Goats and sheep and horses pastured near the Okapi Park were observed at first with curiosity but without fear. Only unaccustomed noises disturbed them. Military bands and the music of the Marist Brothers and above all the noise of low-flying planes frightened them badly. Several times I had to

1. See "Newest Animal — the Kouprey," by William Bridges, *ANIMAL KINGDOM*, March-April, 1943.

2. For the story of its discovery, see "An Okapi Comes to the Zoological Park," by William Bridges, *BULLETIN of the New York Zoological Society*, September-October, 1937.

intervene because of panic among the animals, and one death was caused by panic. Automobiles and trucks did not long disturb them. I should point out the fear they had of snakes. Several times they scented or sighted a snake, and this made them huff and herd together in the corner the farthest distant from the snake."

From Dr. Els' notes it appears that the gestation period is probably 15 to 16 months. The new-born Okapi stood about 31½ inches at the shoulder. It grew 3 centimetres (1.18 inches) in the first 20 days, 3.5 cm. (1.38 inches) in the next 20 days, 5.5 cm. (2.16 inches) the next month and 6 cm. (2.36 inches) the following month. The baby was a female (named Lorraine) and it was born during the night of April 19, 1941. All day long it remained lying on the ground and periodically the mother and other Okapis came over and licked it. The baby nursed for the first time 11 hours after birth, but it was 72 days old before it ate its first green leaves. Cooked corn it took at 92 days. Dr. Els comments that a young Giraffe (gestation period, 14½ months) eats solid food at 22 days and ruminates at four months. He never did determine that the young Okapi ruminated.

Little Lorraine's mother, Epulu, died on July 25 and the baby was adopted by another Okapi whose young had died at birth. The foster

mother had little milk, however, and Lorraine steadfastly refused to take milk from a bottle or from a pan, although she drank water easily enough. She died on August 31, 1941, at the age of 144 days, apparently from over-eating cooked corn at a time when she was not yet ruminating.

It was a discouraging experiment in Okapi-breeding—to see one animal after another die of accident and disease—but as Dr. Els' report remarks, such losses are inevitable in the beginning and are attributable to "our ignorance and the biology of the Okapi." The Okapi's biology will not be modified by such an experiment, but certainly Belgian Congo veterinarians and officials learned much by reason of it.

Brother Joseph Hutsebaut also told me something about his own early beginnings in the Okapi-rearing art. He began learning it just twenty years ago.

I have his own notes on the various Okapis that were captured near Buta and brought to him to rear. (Altogether he has had 15 of them, of which 12 were adult). His first capture was also one of the most successful.

"The first Okapi [at the Buta Mission] was a young female, two to three weeks old, that was captured in 1927 near the Teli River," he wrote. "It was named 'Teli,' and was brought up on

Brother Joseph Hutsebaut has kept fifteen Okapis at the Mission of the Premonstrant Fathers at Buta, including the magnificent specimen now in our Zoological Park.

Photo courtesy of Dr. James P. Chapin





Dr. Louis van den Berghe Photo

This little animal is "Congo," our Okapi, photographed in a yard at the Premonstrant Fathers Mission at the time of Dr. Louis van den Berghe's visit to Buta in 1936. An Okapi captured a few years previously had given evidence of sleeping sickness and Dr. van den Berghe made careful examinations of four animals at Buta, including Congo. All were free from disease.

milk from the native cows. When King Albert and Queen Elizabeth visited Buta in August, 1928, Teli was presented to them and I accompanied it to the Antwerp Zoo in September of that same year. It survived there until near the end of the war, in 1943 or 1944.

"The second Okapi at Buta was captured in a rectangular pit about $6\frac{1}{2}$ feet long, 40 inches wide, and 6 feet deep, in 1931. In the summer of the next year I took it to Matadi and put it on a ship bound for Antwerp; it was while returning from that journey to Matadi that the automobile accident occurred which put me in the hospital for a long time. The Okapi arrived safely at Antwerp, but died a short time afterwards—from what, I can't say.

"Since the Ministry of Colonies and the Antwerp Zoo had asked me to try to capture other Okapis, and since I had no time to roam the forest myself, I thought it would be a good idea to capture them in pits. The natives make their pits very narrow and deep in order to capture animals of various kinds, which they usually kill in the pits. They make the pits in the shape of a wedge, and even put pointed stakes in the bottom to kill animals that fall in—they are hunting for meat, of course.

"I therefore showed my men how to make a pit to capture Okapis alive. It was very difficult to convince them. They all said the Okapi would jump out. I said, 'Yes, antelopes would—but not the Okapi. He wouldn't know how to jump out.'

"I showed them how to fill the bottom of the pit with branches so the animal wouldn't break its legs when it fell in, and thus the first result was the capture of an adult Okapi. It was tied up with ropes, bound around with gunny sacks, placed on a litter and carried out of the forest to the automobile road where it was transported by truck to the Mission.

"Since this method was hard on the animal and was not good for very long distances, I had cages built in the forest. When the beast was taken in a pit, the finished cage was set up six to ten feet from the pit's edge. Then a palisade

was built from the cage to the pit and little by little we threw earth into the pit until it built up a sloping runway and the animal could scramble up and out. We carefully covered two sides of the cage with branches, but not the far end. Thus the animal saw daylight at that end and walked toward the cage, thinking to escape. Then we quietly blocked the corridor behind him until he was safe in the cage.

"If an Okapi is captured not too deep in the forest, and the land is level, one can make a cage without a bottom and simply carry it to the road, letting the Okapi walk.

"All our adult Okapis that were captured in pits, if they were not seriously injured in falling into the pits, were transported safely."

Brother Joseph commented that two adult males were captured in 1934 and he took them to Belgium the following year. One went to the London Zoo and the other remained in Antwerp, becoming ill a few weeks later. Dr. Rodhain of the Institut de Medicine Prince Leopold in Antwerp examined it and found evidence of trypanosomiasis (sleeping sickness). The animal died a short time later, and Brother Joseph believes it contracted the disease while being transported down the Congo River in an open cage.

Dr. Rodhain's interest was aroused by finding sleeping sickness in the animal in Antwerp, and he had Brother Joseph send him blood samples from four animals brought to the Mission in 1936. They were all free from the disease. Dr. Louis van den Berghe of the Institut de Medicine, who visited Buta about that time, re-examined them and found nothing. One of the four was the specimen sent to the New York Zoological Park—the fine, healthy animal that we know as "Congo."

Some months ago Dr. van den Berghe, now in the United States on official business, visited the Zoological Park and was greatly interested to see the present size of the baby Okapi he had examined in far-off Buta eleven years ago. To his kindness we are indebted for the excellent photograph of "Congo" in his baby days at Buta.

Ailing Angels — and Other Problems

By JAMES W. ATZ

THE VISITOR in Dr. Ross F. Nigrelli's office looked up casually when the door opened and one of the New York Aquarium's tankmen put his head in.

"Say, Doc, can you come out a minute? One of the Angels is sick."

That perked the visitor's attention right up. "Angels? Do you mean to say you exhibit —?"

"No, no!" Dr. Nigrelli laughed. "These are Angelfish!"

* * *

The pathologist of the New York Aquarium is often a very busy and hard-pressed man. A sick Angelfish is likely to be a routine problem, encountered before and long since solved, but much of his work is pioneering, for the systematic study of fish diseases is still a baby crawling on the floor — and as for the diseases of the water-dwelling invertebrates such as anemones and starfish and shellfish, our knowledge of *their* diseases is hardly even embryonic. And yet, the Aquarium pathologist meets them constantly and somehow has to solve them.

Medical men dealing with human patients have centuries of experiment and recorded observation at their command. Our pathologist, too, can rely upon the labors of other investigators, and in the New York Aquarium he has the facilities of a well-equipped laboratory and a technician. But the field of fish pathology is so new that his own personal experience with diseases in the fish tanks is of the very greatest importance. Fish can't talk. They can't tell the doctor what ails them.

Take the case of our "sick Angel," for example. What does an ailing Angelfish look like? How is it different from an Angelfish in normal, healthy condition?

Peering into the exhibition tank, Dr. Nigrelli has no trouble finding the sick specimen. It may be "sulking" — keeping to itself in a corner. Its fins may be partly folded and appear to be wilted, instead of being held crisply erect. Perhaps — more subtle symptoms — it may be swimming in a peculiar pattern, or it may be behaving eccentrically toward its tankmates. Sometimes the warning sign of trouble is the behavior of its tankmates toward the sick fish itself.

Books do not tell an Aquarium man how to recognize an ailing fish. Only long experience with vast numbers of fishes of many kinds, in health and in sickness, can give one a quick and unerring eye for maladies.

Diagnosis is, as usual, a difficult part of the business. Sometimes the fish's behavior gives a clue. Fishes with external parasites often try to dislodge them by brushing against the rockwork in their tanks. Labored breathing may indicate gill parasites. A few disorders are characterized by abnormal growths and lesions that are easily recognized. But more often the cause can be revealed only by special techniques.

Unable to determine what is the matter with the sick Angelfish simply by looking at it, Dr. Nigrelli draws on his experience and suspects that it may very well be *Benedenia melleni*. Angelfishes, he knows, are especially susceptible to attacks by this parasitic worm. For fifteen years it plagued the old Aquarium, in some years causing as much as 40% of the deaths of marine fishes. At that time the Aquarium had no pathologist, and it was two students from New York University who first worked out the life history of the destructive parasite.¹

The full-grown worms are never more than one-fifth of an inch long. By means of suckers



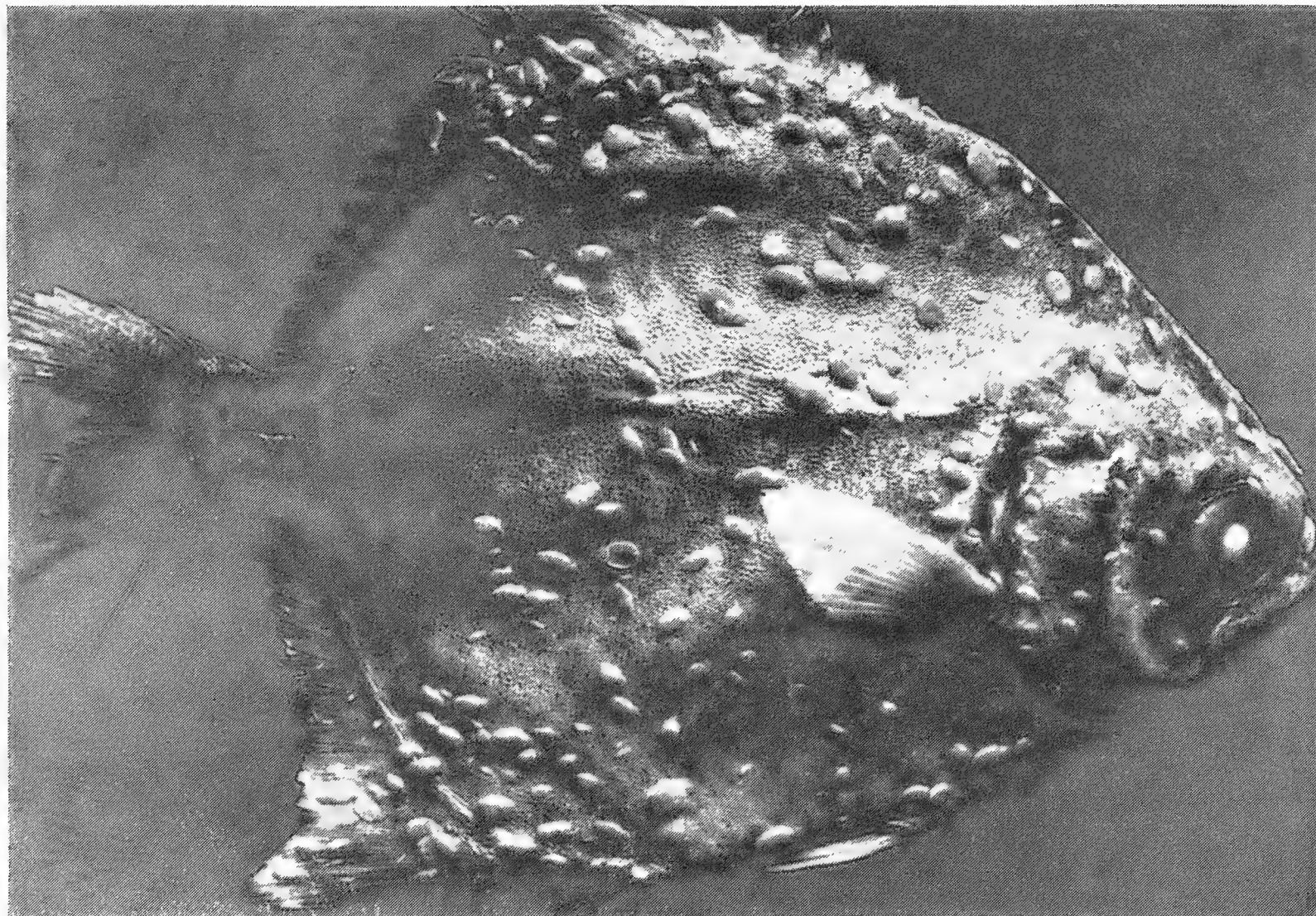
In the Aquarium laboratory, Dr. Nigrelli and his technician prepare a slide for microscopic examination of a protozoan infection on the skin of a Disc Cichlid. This is routine procedure.

and hooks they fasten themselves to the skin and eyes of a fish in such numbers that they can completely sap its strength, often causing it to become blind or to lose large patches of scales. *Benedenia melleni* is a trematode, related to the notorious liver and blood flukes of man, but unlike these, it does not undergo a complicated life-cycle, involving a stage inside a snail. Instead, the infective worm, which swims freely searching for a host, develops directly from a tiny egg, about a week after it has been laid. Each adult produces hundreds of eggs, so it does not take long for devastating epidemics to appear, once a few parasites have been introduced into a tank.

Learning the worm's life story, however, was only the first step in conquering it, and several more years of experimentation were necessary before a satisfactory method of control was evolved.² The effects of water temperature and density and

of many chemicals on the parasite and its eggs were studied, but it was found that most treatments were as detrimental to the fishes as to the worms hanging on them. The best individual treatment turned out to be dipping in fresh water, although the duration of the bath must be carefully watched, since fresh water is quickly fatal to the great majority of marine fishes.

By putting the sick Angelfish into a can of fresh water for a minute or so, Dr. Nigrelli determines whether or not it is infested with *Benedenia*. When exposed to fresh water, the worms quickly drop off the fish and readily can be seen lying on the bottom of the container, although they were invisible while attached to the fish. It is of great importance for the pathologist to know whether *Benedenia* is present, for if it is, he must immediately take steps to halt a possible epidemic. It may become necessary to disinfect



This small Round Pompano died as a result of infestation by hundreds of parasitic worms (*Benedenia melleni*) which had obtained their sustenance from it, digging under the skin. Ordinarily the parasites are transparent and practically invisible, but a special photographic technique makes them visible here.

the whole water system — tanks, pipes, pumps, filters and all. Great care must be taken to make sure the parasite does not spread to any other separate water circulation through infected fishes or contaminated water or nets.

Here, the question might well be asked: How do the fishes in an aquarium get infected originally? Where do the parasites come from? The answer is, the fishes bring them in from the wild.

One of the common fallacies (originating perhaps with Rousseau and his noble savages) is that most of man's ills can be attributed to his "unnatural," civilized life. The corollary is that primitive men are much healthier than civilized people, and wild animals much less subject to disease than domesticated ones. Regarding men, the statement is certainly a gross exaggeration, while that about animals couldn't be further from the truth. To take only fishes, a study of more than two thousand specimens of seventy-nine species from Lake Erie revealed that 58% were infected with one or more kinds of parasites.³ Puffers from Sandy Hook Bay were examined for three successive years and over 80% were found to carry parasites.⁴ Epidemics are known to occur among natural populations of fishes, sometimes killing millions of them. Dr. Nigrelli has detected two of these in our own back yard, so to speak, affecting large numbers of fishes in Sandy Hook Bay.

The cause of these natural epidemics were two

1-celled (protozoan) gill parasites, and when they got into the Aquarium's collections they became serious pests. Although *Benedenia melleni* was first described from specimens living on fishes in the New York Aquarium, its natural home is the West Indies, and it has turned up in all public aquariums — among them the ones at Boston, Chicago, Philadelphia and London — that have collected fishes there.

Thus, every fish that is brought into an aquarium is a potential "carrier" of infection. It is the duty of the pathologist to see that proper preventative measures are carried out to eliminate or minimize this ever-present danger. Up to now no public aquarium has ever had an adequate system of quarantine and isolation, keeping new specimens apart from old ones and susceptible species away from "carriers." Such a program has been worked out for the new New York Aquarium and will be incorporated, insofar as is financially and mechanically feasible. Dr. Nigrelli is at present engaged in studies on the diseases and parasites of marine fishes that will enable him to prevent and treat their disorders more efficaciously than ever before. Just as a Public Health Officer finds it best to control epidemics of human contagions by never letting them get started, so the Aquarium's pathologist relies mainly on *prevention* rather than *cure*, and the essence of Dr. Nigrelli's program is to keep infected specimens isolated from others or not allow them to enter the collections at all.

To maintain this watch over his fishes, the pathologist must have the assistance of a laboratory, providing means for autopsies of specimens, chemical analyses of water, bacteriological determinations and microscopic examination of tank water and tissue — since the most virulent disease-producing agents are often too small to see unless magnified, and many disorders can only be detected by the microscopic study of thin slices of brain, liver, intestine or other vital organs. Each specimen that dies is examined and, if possible, the cause of its death determined. Fish die from a great variety of causes — fully as many as human beings. Many, indeed, are common to both fish and man.² Viruses, bacteria, fungi, protozoa, copepods, leeches and innumerable kinds of worms can kill fishes. Vitamin and other dietary deficiencies fatally afflict them. So do many of the so-called degenerative diseases like cirrhosis of the liver or fatty degeneration of the heart. Almost every year Dr. Nigrelli discovers new causes of death.

Fishes from all over the world have been exhibited at one time or another at the New York Aquarium, and it is likely that Dr. Nigrelli has had the opportunity to observe and study a greater diversity of parasites and diseases than anyone else not working in a similar institution. It is only natural, therefore, that the laboratory of the New York Aquarium should become a kind of clearing-house for information and advice on the ailments of fishes. Tropical fish

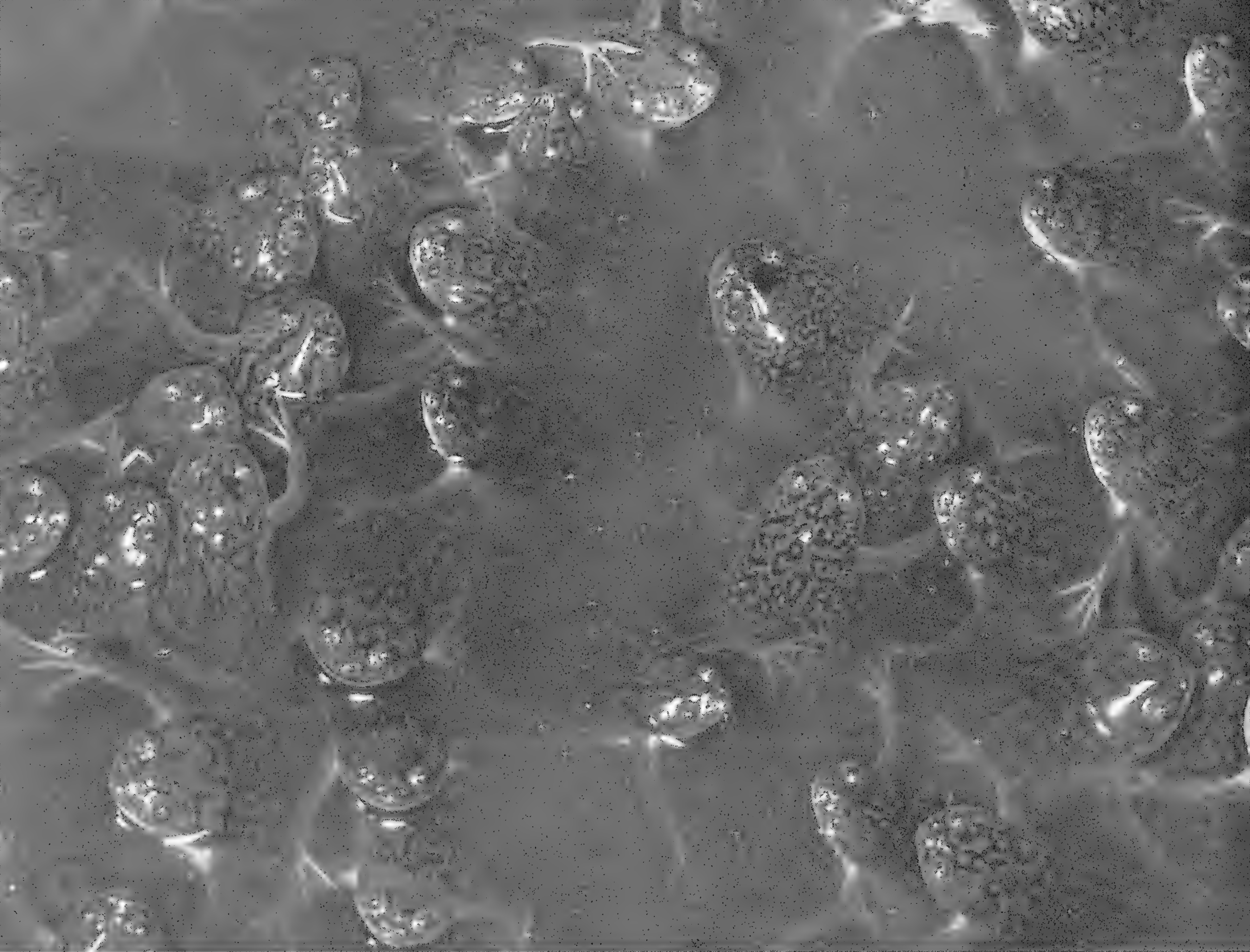
fanciers, hatchery operators, public health food inspectors and fish and game conservationists alike consult the pathologist and his records when they have sick fish on their hands.

In 1937 the U. S. Fish and Wildlife Service began an investigation of the copepod parasite of the Redfish, or Rosefish, that was sometimes making more than 10% of the catch of this important food fish unmarketable. The parasite, a distant relative of crab and shrimp, grows to be four inches long and causes unsightly sores and tumor-like growths where it attaches itself to the skin of its host. The pathological effects and life history of this copepod were studied by Dr. Nigrelli and correlated with work on its distribution done by federal biologists.⁵ Similarly, Dr. Nigrelli participated in a comprehensive analysis of the biology of the Ocean Pout, part of a plan to make this food fish better known and more available commercially. He found ten different species of parasites — three of them never before described.⁶ Some of these might prove dangerous to man, and the Government does not allow parasitized Ocean Pouts to be sold. When federal investigators became interested in the parasites of the Puffer, another species first widely used for food during the War, they discovered that the Aquarium's laboratory had already made such an inquiry.

Physicians and medical research men make good use of the Aquarium's laboratory. Fishes have come to assume an ever-increasing impor-

Pigmented cancers can be produced to order by Dr. Myron Gordon's work with Platyfish - Swordtail hybrids. The small fish at the top is a Spotted - dorsal Platyfish with small black spots (non-cancerous) in the dorsal fin. Crossed with the Swordtail at the bottom of the picture, it produces offspring (center) with a black and sometimes fatal cancerous dorsal fin.





Lilo Hess Photo

A tankful of *Xenopus laevis* — the African Clawed Frog, a valuable animal for the diagnosis of pregnancy. The New York Aquarium's laboratory was the testing ground for methods of maintaining the frog in captivity, thereby making it readily available to American doctors.

tance as experimental and test animals, and they must be kept healthy in captivity, else they react falsely. The importation and maintenance of medical test fishes like the Elritze and Bitterling — employed in cancer and hormone tests, respectively — have for years been a regular “service” of the Aquarium, although our activities along these lines have been curtailed of late by lack of space in our present quarters at the Lion House in the Zoological Park.

Among the many medical men who have used the facilities of the Aquarium's laboratory to carry on their researches, the outstanding (to us who benefited so much by them, at any rate) have been Dr. George M. Smith of Yale University and Dr. Homer W. Smith of New York University. The latter's analysis of kidney function

in marine fishes and in Lungfishes, largely pursued at the old New York Aquarium, has become what is called classical and led directly to the development of a method of chemical control of the Aquarium's sea water that has proved invaluable.⁷ More than a decade ago, Dr. George M. Smith, recognizing the unexploited opportunities for the study of cancers and tumors of aquatic animals in large public aquariums, initiated and fostered a program of work on neoplasms that has made the New York Aquarium one of the centers of the study of abnormal growths.

Fishes apparently are subject to the same kinds of cancers and tumors as are human beings — and several that human beings never get, besides. Well over a dozen distinctly different types of neoplasms have been observed in fishes from the

Aquarium's collections. One kind can be produced spontaneously, yet at the will of the experimenter, by crossing certain genetic strains of two small, tropical top-minnows, the Platyfish and Swordtail. Dr. Myron Gordon, the Aquarium's geneticist, can not only predict the percentage and sex of cancerous offspring resulting from a given cross, but he can even anticipate in what part of the fish's body the abnormal growths will appear!⁸ Our Genetics Laboratory is at present located in the Whitney Wing of the American Museum of Natural History, through the generous cooperation of that institution.

Platyfish and Swordtails are also being used in other genetic work and in many hormonal, embryological and anatomical studies. Their present status as one of the standard laboratory animals is largely the result of the efforts of Dr. Gordon. This development of new kinds of experimental animals, together with ways and means of maintaining and breeding them in captivity, has been one of the principal objectives of the Aquarium, since this aspect of laboratory technique is one we are especially well-suited to perform, our primary job being the maintenance of living creatures. To Curator-Aquarist C. W. Coates goes the credit for discovering that the Electric Eel is an almost ideal animal for the

study of the physiology of bio-electricity and nerve. It was also he, assisting Dr. A. I. Weisman of the Jewish Memorial Hospital, who first imported the African Clawed Frog into the United States for use in human pregnancy diagnosis. Before 1939 this valuable test animal was virtually unknown to the medical profession of America, although it was in limited use in Europe and South Africa. Dr. Weisman and Curator Coates refined the testing technique and developed simple ways of keeping the frogs in healthy condition in the laboratory.⁹ Now the Clawed Frog is employed for diagnosis in hospitals and laboratories all over the country.

Yet all these services and scientific studies, emanating from the laboratory of the New York Aquarium, are in the nature of extra dividends — contributions to the health and welfare of people, resulting from the necessity of having a laboratory in a public aquarium, which in turn arises from the inescapable fact that fishes, like people, are forever getting sick.

¹ Jahn & Kuhn, *Biol. Bull.*, 62: 89-111, 1932.

² Nigrelli, *Zoologica*, 28 (22): 203-216, 1943.

³ Bangham & Hunter, *Zoologica*, 24 (27): 385-448, 1939.

⁴ Nigrelli & Atz, *Zoologica*, 28 (1): 1-8, 1943.

⁵ Nigrelli & Firth, *Zoologica*, 24 (1): 1-10, 1939.

⁶ Nigrelli, *Bull. Bingham Oceanogr. Coll.*, 9 (5): 185-221, 1946.

⁷ Breder, *Bull. N. Y. Z. S.*, 38 (4): 110-119, 1935.

⁸ Gordon, *Spec. Pub. N. Y. Acad. Sci.*, 4, In press.

⁹ Weisman & Coates, "The South African Frog (*Xenopus laevis*) in Pregnancy Diagnosis," 134 pp., 47 figs., New York, 1944.

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A Unique Moving Picture Made for You

By DONALD T. CARLISLE

YOU HAVE long known of your Society's interest in New York's newest, most exciting institution—the NEW New York Aquarium—planned to be the world's greatest Aquarium and under our direction.

The creation of this beautiful building, its collections, laboratories and study-halls, is a colossal job. It needs the active help of all Society members. Seven years have passed since the Old Aquarium at the Battery was closed. The memory of the public is short. It will require the active support of many people to reestablish the Aquarium. But it will be worth it. More than 2,000,000 people each year visited the Old Aquarium, next to the Zoological Park the most popular institution in the City. It has been completely and conservatively calculated that the stunning new building will serve many more than this.

As a part of the work of creating widespread interest in this great project of ours, your Society has produced an unusual motion-picture—something the movie people tell us has never been done before. It is a photographic record of a trip through a building that doesn't yet exist!

In this film you will see not only a wide range of the species that will be exhibited, but your recollection of the Aquarium's great work for general science, medicine and industry will be refreshed. You will see the imposing grandeur of the building as a whole and you will enter it and have a pre-preview of a number of its beautiful and dramatic architectural features—a structure such as you have never seen before.

You will go behind the scenes and learn something of the water treatment problems, the miles of piping, the intricate control systems that must be devised to operate the largest, most modern

Aquarium in the world. It is a truly unusual picture—the work of a number of the best technicians of our time.

Soon to Be Released

This film will be available free to members at as early a date as possible this fall. We need to have it seen by as many of the 7,000,000 New York population as we can muster. Plans are afoot for its distribution throughout the schools. It will be made available to clubs, lodges, churches—all organizations of all types throughout the metropolitan area. Other important means of its distribution are being worked out but cannot now be reported.

You can help spread the story of the New Aquarium. If you have a movie projector of your own, organize a movie party among your friends. If you belong to a garden club, or an association, society or service club that holds evenings of entertainment or that has program lunches, this film will make an ideal occasion. If you are head of a business or operate a factory, your force should see it. The purpose of the film is to make people—all people—want the new Aquarium.

We hope you will rush to the telephone and call CIRCLE 5-5750 for a reservation for this unique film. The number of available prints will of course be limited and it will have to be "first come, first served." But our plan is to give our members *first* opportunity for a preview—a Hollywood opening right in your own home or club or plant. We will give you some brief suggestions for its use that we hope will be helpful.

Remember, telephone CIRCLE 5-5750 or write the New York Zoological Society, 630 Fifth Avenue, New York 20. Your New Aquarium will truly delight you.

"First-timers"

(Continued from page 144)

Urogale has a strikingly elongate snout, rather swollen to make room for two enlarged teeth, the second incisors. The Tree Shrew group as a whole is found only in southeastern Asia (including India) and the East Indies. These creatures are remarkably squirrel-like in general appearance and in their active arboreal habits; but they are undoubtedly extremely different in food habits, and prey on all small living animals that they find, much as does the Tarsier.

It is to be regretted that *Podogymnura* (a rat-like insectivore whose common name is "Gymnure"), the third member in this successive series of linking types (*Tarsius* linking the Lemurs and anthropoids, and *Urogale* the Primates and insectivores), is not included in the current series of Philippine additions to the living collections in our zoological gardens. *Podogymnura* appears to be one of the most primitive types among living mammals, its interest lying precisely in the fact that it is *generalized*. Another notable mammal of the southern Philippines (unfortunately not represented in Lieutenant Wharton's living series), is the Flying Lemur.¹ It is quite the opposite of *Podogymnura*, so specialized in its extreme adjustments for gliding flight and in having a unique development of comb-like incisor teeth, that arguments as to its relationship are best met by assigning it to a distinct order (Dermoptera). The Flying Lemur is nocturnal, and perhaps not especially attractive as a zoo animal, sleeping rolled up as a ball of fur. The mother and the single young, however, present a remarkably pleasing sight. The mother hangs suspended by her limbs, like a sloth, and her gliding membranes form a living hammock from which the baby looks out. Like the Tarsier, the Philippine Flying Lemur proved to be not at all uncommon wherever its forest habitat was being cleared away.

A different range of zoological interests is represented by the large rodents known as "Cloud Rats," from their montane cloud-forest habitat, of which the Wharton collection includes two types, *Crateromys shadenbergi* and *Phloeomys*

cumingi. The rodents of the Philippines include a great number of species closely allied to the continental squirrels and native rats; among these the Cloud Rats and a number of other peculiar genera, mostly from Mt. Data in Luzon (and mostly unknown in Mindanao) stand out as a most distinguished element of the Philippine fauna. Unlike the Tarsier and Tree Shrew, these strange-looking rodents are little known outside the strictly zoological world. Both are large for rodents (thirty inches or more in length) and both have relatively long hair. *Crateromys*, ordinarily black, proves to be quite variable in coloration. These forms, with several other generic types of rodents in the Mt. Data region evidently form a much older element in the Philippine fauna than the common rats (*Rattus*), and squirrels.

Accompanying the remarkable Philippine mammals brought to America by Lieut. Wharton were three specimens of the largest of the Philippine birds, the Monkey-eating Eagle. One of these specimens had been taken alive by the Chicago Museum party, and was transported to the Brookfield Zoo for them by Lieut. Wharton, and two others were obtained independently. The Monkey-eating Eagle has been regarded as the rarest of Philippine birds, and its ecological position, as a giant predator at the apex of a "food pyramid," indicates that it must in fact be relatively vastly less abundant than the smaller creatures at the base of the pyramid. Nevertheless, when the abundance of the larger predatory animals under natural conditions is remembered (Lions, for example, or Jaguars), there may well be greater numbers of this eagle in the wide expanse of the Mindanao forest than has been thought. It would be of great interest to have some factual information as to the extent of the territory required to support a pair of these birds, the largest of the Philippine eagles.

The "monkey-eating" propensity of this eagle was reported by its discoverer, as its scientific name *Pithecophaga* is a direct translation. It was unknown to scientific circles until the late Eighteen-nineties, and only five specimens had become known by 1909. Exceeding a length of three feet, it has relatively short and rounded wings and a long tail, and is thus distinguishable in flight from the Sea Eagle. It has a flapping

¹ Lieut. Wharton did bring back a Flying Lemur, but it died a few hours after he reached New York.

flight, with relatively little soaring, like a giant Goshawk, perhaps reflecting its forest hunting habits. *Pithecophaga* is remarkable for its extremely powerful bill, which is so deep and narrow as to be quite unique in form among birds of prey. The naked tarsi and feet are only slightly less powerful than those of the Harpy Eagle of the American tropics, with which it is most naturally compared. Its crest of feathers forming a halo around its head, and its piercing pale blue eyes contribute to its spectacular appearance. It has a loud wailing cry, perhaps best

described as "aquiline." Little beyond its monkey-eating habits is known of the life of this bird. Its nest consists of a flat platform of dry sticks constructed in high trees and likely to be quite invisible from below.

Delacour and Mayr, in their recent volume on Philippine birds, remark that this wonderful rare eagle deserves complete protection. It is perhaps most effectively protected by the inaccessibility of the larger untouched forests of Mindanao, but effective protection must envisage a wild-life reserve of great extent.



"Spectacular" is the right word for the Monkey-eating Eagle when it spreads the crest of feathers around its head and stares down from its perch with piercing pale blue eyes.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Cancer Research Grant to the Society

The cancer research work of the Zoological Society has been expanded in a new direction by a grant-in-aid from the National Cancer Institute in the amount of \$4,595.

This addition to the previous grant of \$8,600 will enable Dr. Emil Liebman, a hematologist, to work with Dr. Myron Gordon, making qualitative and quantitative analyses of the blood of Platyfishes, Swordtails and their normal and melanotic, cancerous hybrids. A comparison of the blood-picture of healthy and diseased specimens will then be made. This is one approach to the physiology of melanomas and what makes them deadly to fishes. Strains of known genetic constitution, in which the incidence and intensity of melanoma can be predicted, are essential to this work; The Aquarium's Genetics Laboratory, under Dr. Gordon's direction, maintains such stocks of both pure-bred and hybrid fishes.

* * *

Dr. Ross F. Nigrelli and Dr. Myron Gordon of the Aquarium staff, collaborating with Dr. Eli Goldsmith of New York University, presented a paper at the Montreal meeting of the American Association of Anatomists on "The effect of amputation of the dorsal fin upon the development of Sd melanomas in hybrid fishes." The paper is one of a series of experimental studies on fish cancers.

We Get Sea Water

With the aid of two good friends, Mr. Eric K. Klaussman of Douglaston, L. I., and Mr. Joseph Mintzer of the Bronx, the Aquarium has established a small collection of marine fishes.

The principal difficulty in maintaining salt water fishes is the procurement of good sea water. Local beaches are reasonably accessible, but their water is so diluted that it is not suitable. Even a small circulating system requires at least eighty gallons of sea water, weighing some six hundred pounds, so obtaining it is not easy. Mr. Klaussman took a number of five-gallon jars far out in Long Island Sound on his cruiser and there filled them with good sea water, enabling us to start our system.

Into our marine tanks we put five Clown Fish which had been brought to New York from Sumatra by a sailor, and a number of young local marine species, including Sea Robbins, Puffers, Orange Filefish, Tautogs, Pompanos and Green and Hermit Crabs. These were caught and donated to us by Mr. Mintzer.

The Duck-bills Still Draw

Although it will be necessary late in the fall to take the Duck-billed Platypuses off of exhibition for the winter (because of the cold which is much greater than in their natural habitat in Australia), more than 200,000 persons probably will have seen them by that time. The attendance passed the 100,000 mark on July 22 and on September 1, after 130 days of exhibition, had climbed to 153,736.

All three of the Platypuses are feeding well and give every sign of being satisfied with their home, the "Platypusary" south of the Elephant House.

During the autumn word was received from Mr. and Mrs. David Fleay, who brought the Platypuses to us, telling of their arrival in Australia. They took home for exhibition to Australians a small cargo of common American mammals, birds and reptiles, almost all of which survived the long voyage.

A Telegram for Pete

We are a little late in acknowledging by way of ANIMAL KINGDOM a telegram addressed to "Pete," care Curator, Bronx Park Zoo, received in mid-July—but Hippopotamuses are notoriously slow animals, and the Pete referred to is our elderly Hippo who celebrated his forty-fourth birthday on July 13.

The telegram read: "Congratulations on your forty-fourth birthday. I met you first when you were three days old. I have visited you often, as have my children and grandchildren." The message was signed "Robbins Gilman, Sponer, Wis."

Our Members who are amateur motion picture photographers will be interested in the announcement of the American Humane Association of its 1948 Motion Picture Contest on pets, domestic animals, birds and wildlife. Details can be obtained from the Association at 135 Washington

Avenue, Albany 6, N. Y. The Zoological Society's Curator of Publications will again be one of the judges of the contest next year.

Skinks from Palestine

During the summer Dr. George Haas of the Biology Department of the Hebrew University in Jerusalem spent a good deal of time at the Zoological Park and on his return to Palestine we presented him with a collection of common American reptiles which are, nevertheless, rarities and of great interest in Palestine.

In return, he has sent our Reptile Department a collection of Palestinian Skinks, common there but previously unknown in our collection. They included the Eyed Skink, *Chalcides ocellatus*; the Dwarf-legged Skink, *Chalcides guentheri*; and the Yellow-lined Skink, *Eumeces schneideri*. These interesting members of the lizard family have been put on exhibition in the Reptile House.

PUBLICATIONS OF INTEREST

BIRDS OF MALAYSIA. By Jean Delacour. The Pacific World Series. The Macmillan Company, New York, 1947. xvi plus 382 pp., 84 line drawings. \$5.

Malaysia comprises an area of something like 600,000 square miles. It includes the Malay Peninsula, with the great nearby islands of Sumatra, Java and Borneo and innumerable smaller ones. Palawan, politically associated with the Philippines, is zoologically included in Malaysia. A total of 660 species of birds are known to breed in this vast area, while about 120 more have been recorded as visitors.

Up to this time, there has been no field book of the birds of Malaysia and such works as have been published on various sections are either highly technical or are now practically unobtainable. To produce, in a single volume, adequate keys, identifications and habit sketches for such a diverse assemblage of species, was obviously a Herculean task. To it, Jean Delacour has applied himself with his usual energy and enthusiasm and has produced a most satisfactory result. The tyro who seeks the name of the bird he has seen, will find it; the scientist will find himself using the shortcuts so well defined in "Birds of Malaysia." — LEE S. CRANDALL.

MAMMALS OF EASTERN ASIA. By G. H. H. Tate. The Pacific World Series. The Macmillan Company, New York, 1947. xiv plus 366 pp., 79 line drawings. \$4.

To limit the scope of a work to Eastern Asia seems, at first glance, a rather tight restriction. But when it is considered that the Asiatic coastline extends approximately 6,000 miles, from northeastern Siberia to the Malay Peninsula, with a few islands thrown in for good measure, the task at once assumes major proportions and the restriction is no longer tight.

Aside from the Elephant, the Rhinoceros, the Tiger and the Leopard, the Gibbon and the Panda, Asiatic mammals are but little known to the American public. Dr. Tate will bring to many at least a reading acquaintance with a host of creatures generally known only to specialists. Tree Shrews, Flying Lemurs, Ferret Badgers, Banded Linsangs, Pangolins and Giant Flying Squirrels, all are here.

To interpret in reader's language a science which deals almost exclusively in anatomical characters, unseen in the living animal, is an unenviable assignment. Dr. Tate has achieved an excellent result and will have the gratitude of layman and specialist alike. — LEE S. CRANDALL.

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For the Greatest Number

THE YEAR IS NEARING ITS END. It is vastly encouraging to consider how far the work of the Society reaches in bringing enjoyment of the living natural world to very great numbers of people—to the millions that annually visit the great Zoological Park that is under our direction and, in addition, to great numbers in far away places through the written word and through motion pictures. As an example of what can be accomplished with the latter, the Society several years ago produced a film on the subject of bird migration. It has been viewed by more than twenty million people in various parts of the world, even as far away as Egypt, South Africa and China. This year a new series of motion pictures, of unusual beauty and meaning, will be completed. For their widespread distribution we may hope as greatly.

One can never help being conscious of those crowded into cities, who have had, as always, too little of the refreshment that comes from seeing the living things of nature which, though not food for the body, are nourishment for the spirit.

The mind pauses, sensing once again the images or sounds that memory summons—the flash of flight or a song from the heart of a woodland, the quick movements of the small and furry one pre-occupied with harvest, the swirl in the placid water at the bend of the stream, the call from the air at dusk of those journeying southward, the silhouette of the lone one with curled horns beneath the mountain peak. These are the more familiar visions that live with us here, but too many do not know them. In these realms, in order that the maximum number of people may profit, lies the work of our institution.

Fairfield Osborn

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JAN 1 2 1950





Living conditions are likely to be primitive when a collector penetrates a tropical country. In this hut in the Umbrella Bird region of Costa Rica, Mr. Cordier lived for three months.

A Cargo of Rarities from Costa Rica

By CHARLES CORDIER

IF THERE IS ANY ONE THING a collector of birds dislikes more than another, it is the inactivity of city life when the field work is finished and a collection has been delivered to its destination, a zoological garden. I do not suffer boredom and inactivity in silence, and so the New York Zoological Society was anxious to get rid of me last spring just as soon as I had delivered a collection of birds from Guatemala at the beginning of April.

The question was: where should I go next? The Society was making plans to send me to the Belgian Congo to try to get a few of the greatest animal treasures of Africa, but there were still many arrangements to be made and it seemed the best timing to send me to the Congo in late autumn so I could make my collections and

return in late spring of 1948. Something had to be found to fill my time between April and October.

In 1942 I had collected Umbrella Birds in Costa Rica for the Zoological Society, and had tried unsuccessfully to capture the Three-wattled Bellbird which no zoo had ever exhibited. That bird was too smart for me then, but I have learned some things myself in the past five years and I thought I would like to match wits with this elusive creature. Moreover, the Bird House needed some more Umbrella Birds; I had brought back two males and one female in 1942, and now only the rather plain and uninteresting female was left.

I knew exactly where I could get Umbrella Birds and the Three-wattled Bellbird if I left

◀ **Charles Cordier is one of the two or three greatest animal collectors in the world today, and is pre-eminent in the collecting of birds. Here he is holding a Yapock, or Central American Water Opossum, a "first time" mammal which he brought back from the Costa Rican jungle.**

New York immediately. Everything depends on the seasons in Costa Rica, and if I arrived in Umbrella Bird and Bellbird country even a day after the rains started, I would be wasting my time and would have to stay almost a year before it would be possible to catch the birds. The time was getting short, and I was unhappy in New York, so General Curator Crandall made a quick decision: I was to fly to Costa Rica immediately with a minimum of nets and equipment and my wife was to follow by boat, bringing the heavy collecting gear.

When one knows the territory and the techniques, there are reasonable certainties in the bird-collecting business. Thus, I left New Orleans by airplane on April 23, bound for San José. On May 10 my wife caught up with

me in the Costa Rican capital, and I was able to turn over to her three male Umbrella Birds. I had found them just exactly where I expected them, and caught them one after another, just exactly as I had thought I would. *Sometimes things do work out like that.*

Really, it had been easier than even I had expected. Three days after leaving New Orleans I was on the central Costa Rican plateau and very early in the morning I started on foot and alone along the old trail I remembered from five years ago. The landmark of a clump of dead or half-dead orange trees was still standing, and at 1:30 o'clock in the afternoon I hid my pack in the bushes beside the oranges and began hacking a path to the display grounds a hundred yards off the trail. For me it was an exciting moment, and



This is Umbrella Bird country, very close to the exact spot where our three male birds were caught. In the road is a tiny figure in white, driving a pack horse; the display tree of the Umbrella Birds was a hundred yards off the trail just to the right of the pack animal.

I admit my heart was thumping more from anticipation than from the work of swinging the machete as I approached the spot where a few tall saplings with horizontal branches had once stood. The trees were still there.

It was just as if time had stood still all these years. A male Umbrella Bird was perched nonchalantly in one of the saplings!

I hurried away to make camp at a farm house two hours' distant. Two days later I returned with a helper and all the necessary paraphernalia, which had followed me by ox cart from San José.

At 3 o'clock in the afternoon of May 1, while I was crouched near the display tree and studying the only male visible up to then, I had the pleasure of seeing a female Umbrella Bird alight near the male. He promptly mated with her. Then things began to happen. Seemingly out of nowhere another male flew up, knocking the first male off the perch. The first male was understandably enraged and pursued the intruder, a third male joined in the fracas, and at a prudent distance still another male started a booming call to the female. She, having embroiled the neighborhood, disappeared.

That night I slept well, despite the sand fleas boring into my feet and a couch of crooked sticks laid lengthwise on two supports. The only sound that troubled me was the drip-drip-drip of fog condensing on the leaves. At daybreak rain seemed imminent, but fortunately it held off until I was out of that region. Had the fog turned to rain, there would have been no end to it for eight or nine months.

I was awake long before daybreak and my helper and I groped through the cold fog and half-light to the display saplings. Diligently we set about putting up one of the nets I had knitted five years before, labelled "Umbrella Bird Nets," and lugged around with me ever since. Hardly were its upper corners in place, and we starting to tie the lower corners, when an Umbrella Bird smacked the net near the upper edge. For a moment it struggled and beat its wings, but that only served to ensnare it the more firmly, and then it hung quietly in an enormous pocket.

The next day I netted male No. 2.

The third day I netted male No. 3.

Then the supply of Umbrella Birds was exhausted. Anyway, Mr. Crandall wanted a large



Nets for the trapping of the Umbrella Birds had to be stretched in this tangle of vines and branches; just above the broad leaf in the center was the favorite display spot.

number of species and only a few specimens of each, so I broke camp and returned to San José to turn the three birds over to my wife. On the way back I stopped at a point somewhat past the continental divide, and scanned a ridge a mile away. Five years before I had climbed that ridge in pursuit of Three-wattled Bellbirds. While I was wondering if they were still there, the peculiar squawking call of *Procnias tricarunculata* drifted faintly across the valley. They were still there, "and this time," I thought, "it's going to be different. I have the right kind of nets, and I know a lot about their behavior."

I stayed in San José just long enough to deliver the Umbrella Birds and engage an automobile. The rains were surely coming now, any day. Within two days I was back in the Bellbird country by automobile. When the car could go no further, Providence provided an oxcart going



Bellbirds were caught in this region, which is the central plateau side of the continental divide. A thin strip of woods in the upper center of the photograph had been left untouched by cultivation and here the birds were still to be found. Five years ago this was all jungle.

empty to the exact spot I was heading for. The natives remembered me from five years ago and that smoothed my path; in record time I was installed in a newly-thatched hut. I was not used to such luxury, but not averse to it, either.

On the way to the Bellbird ridge I had gone over the whole procedure in my mind. I remembered one forested slope in particular; there I would set my nets.

That forested slope turned out to be a cornfield. What I had remembered as thick forest was now, five years later, badly cut over and destroyed. Hardly half the forest was still standing.

Nevertheless the Three-wattled Bellbird still liked that country and at almost any given time four or five could be heard singing—or, I should say, making noises. The natives all greatly and

at length praised the vocal performance of this bird when discussing it with me, but they only confirmed my opinion that the natives have no ear for music. The Bare-throated Bellbird of Brazil (*Procnias nudicollis*) sets a really high vocal standard for other Bellbirds. Its ringing call is clear and musical (although some have compared it to the shrieking of a rusty iron pump-handle on a January morning), but the Three-wattled Bellbird makes a noise that is part squawk and part bark.

I spent three trying days studying the Bellbird's habits anew. The natives all told me it perches invariably on a dead twig or branch on the highest tree, well out of reach. I knew that it makes seasonal migrations. From November to March it is in the lowlands, from sea level to



The adult male Three-wattled Bellbird is slightly larger than a Bluejay. Its head and throat are white, its body chocolate brown. The bird takes its name from the thin, fleshy wattles at each side of the mouth and on top of the beak. The top wattle can scarcely be seen here.

1,300 feet. At other times it may be found anywhere from 3,500 to 8,000 feet. No doubt the food supply determines these movements; the birds subsist mostly on the fruit of several kinds of laurel trees.

As to the nesting habits of *Procnias tricarunculata*, I learned nothing except that it nests in abandoned woodpecker holes.

To transfer one of these artists from its lofty display perch to a cage seemed hopeless until patient study revealed one fact: when the sun starts beating down in earnest, the Bellbird seeks the shade—but it keeps on advertising its whereabouts by incessant calling.

Three days of observation from sunup to sundown finally centered on a certain medium-sized fruit tree that seemed to hold an attraction for

the birds. I could never be quite sure of what was happening in the tree, on account of the dense foliage around it, but once I made sure that two Bellbirds tore through its crown in hot pursuit. Then my eye fell on "Junior" who thought, and still thinks, of himself as a great vocal artist. (Junior is now in the Main Bird House in the Zoo, still improving his voice by practice all day long).

This particular young Bellbird was so intent on letting the world know of his talent that he hardly took time out to feed for a minute or two each hour. He was unique in another interesting way—he was always forgetting the First Commandment for Bellbirds, which is to perch high. With amazement I memorized his daily schedule. It always included a 30-second stop on a short,

dead branch just eight feet above the ground, at 12:30 o'clock.

Three days later Junior was in a cage and two other cages held the pair I had seen flashing through the crown of the tree. The trapping operation even paid extra dividends—a Wagler's Cacique, two Blue-throated Green Toucanets, an owl and a hawk.

It was a great thrill to hold a Three-wattled Bellbird in my hand and to examine it closely.

Like everyone else, I puzzled over the fleshy wattles, one on each side of the mouth and one on the forehead. During the courtship period these grow to a length of a good two inches and they seem to get in the bird's way—the male is often seen throwing them back with a head-tossing motion like a girl shaking

back her long hair. The wattles never inflate and do not stick rigidly out and upward, as I have seen them depicted in old books of natural history. Perhaps General Curator Crandall will be able to learn something about the use and purpose of those wattles by observing the birds in the Zoological Park.

Since my luck was holding, I thought I would try next for the striking, all-white Cotinga with yellow feet and bill, *Carpodectes nitidus*, and another interesting bird, *Cotinga amabilis*. Many years ago Mr. Crandall had collected around Guápiles on the Atlantic coast, at an elevation of 1,000 feet, and had seen *nitidus*. It would be nice to take him some Cotingas as a souvenir.

But, alas! I scouted unsuccessfully for a week on the Atlantic slope, and then the rains started. I changed to the Pacific slope, still in the rain. My luck was out—I thought. Instead it had only turned in a new and unexpected direction.

A village hunter urged me to come to his house and look at the skin of a strange animal he had killed. It had hind feet like a duck! He had never encountered it except at one part of the Chira River (I had just come from there on my Cotinga quest), and he caught it easily enough

by pinning it down with a forked stick while it was blinded by his hunting light. That had happened during the dry season, some weeks before.

I recognized the skin; it was a water opossum, or Yapock, and I had a vague idea that it had never been exhibited. Dr. William Beebe had written an interesting chapter in a book many years ago about searching for the Yapock in Panama, but not getting one.

Although I was supposed to be a bird collector,

the rains were making it impossible to get the birds I wanted, so I mentioned the Yapock in a letter to Mr. Crandall. Right back by air-mail came a reply, saying he would like to have a Yapock. So did his next letter after that, and the next, and the next. It seemed that he really wanted a Yapock very badly.

I went back to the Chira River and began making enquiries. The only native in the neighborhood was an inveterate hunter and he knew the animal well; he generally met one or two when night-hunting for deer or pacas along the creeks that flowed into the Chira.

He and I went Yapock-hunting and on the first night surprised a Yapock on the river bank. Our lights were too weak or we were not agile enough—anyway, the Yapock streaked for the water, and made it. The animal can run surprisingly fast, I discovered.

After three more fruitless nights I went away. Then, in the valley of the Reventazón River on the Atlantic slope I met a hunter who had found a Yapock only a month before. He was hunting in the daytime and came upon the animal asleep, curled up in a kind of nest of dry leaves among tall grass growing, as he described it, on a rock in the middle of a stream. He simply picked the animal up and took it home and caged it.

It was completely savage, he said; for days it refused all food, took some fish after a week's captivity, and then promptly died. Its mouth was badly damaged by its efforts to get out of the cage.

OFF TO THE CONGO

Mr. and Mrs. Cordier sailed from New York for the Belgian Congo on Friday, October 10, aboard the SS Tamerlane. They expect to spend six to eight months in the Congo and they hope to return next summer with a great collection of African rarities — a female Okapi, a male Bongo, Mountain Gorillas, the so-called Congo Peacock and a host of lesser treasures.

I heard, too, from Mr. Charles Lankester, the owner of a large coffee plantation near Cartago on the central plateau, that during the thirty-five years he had lived in that country he had twice fished a Yapock out of the large tank used for washing coffee beans. Both specimens he gave to the little local zoo. He was skeptical about my chances of getting such a rare creature within a month or so.

There was surprisingly little reliable information I could pick up about the Yapock. I was told that it lives "along" the banks of the rivers and small streams, and burrows into them. I did not see any burrows myself. It apparently feeds largely upon the 8-inch fresh-water shrimp that abound in these streams, and the natives told me of seeing dry excrement made up largely of shrimp shells and fish bones.

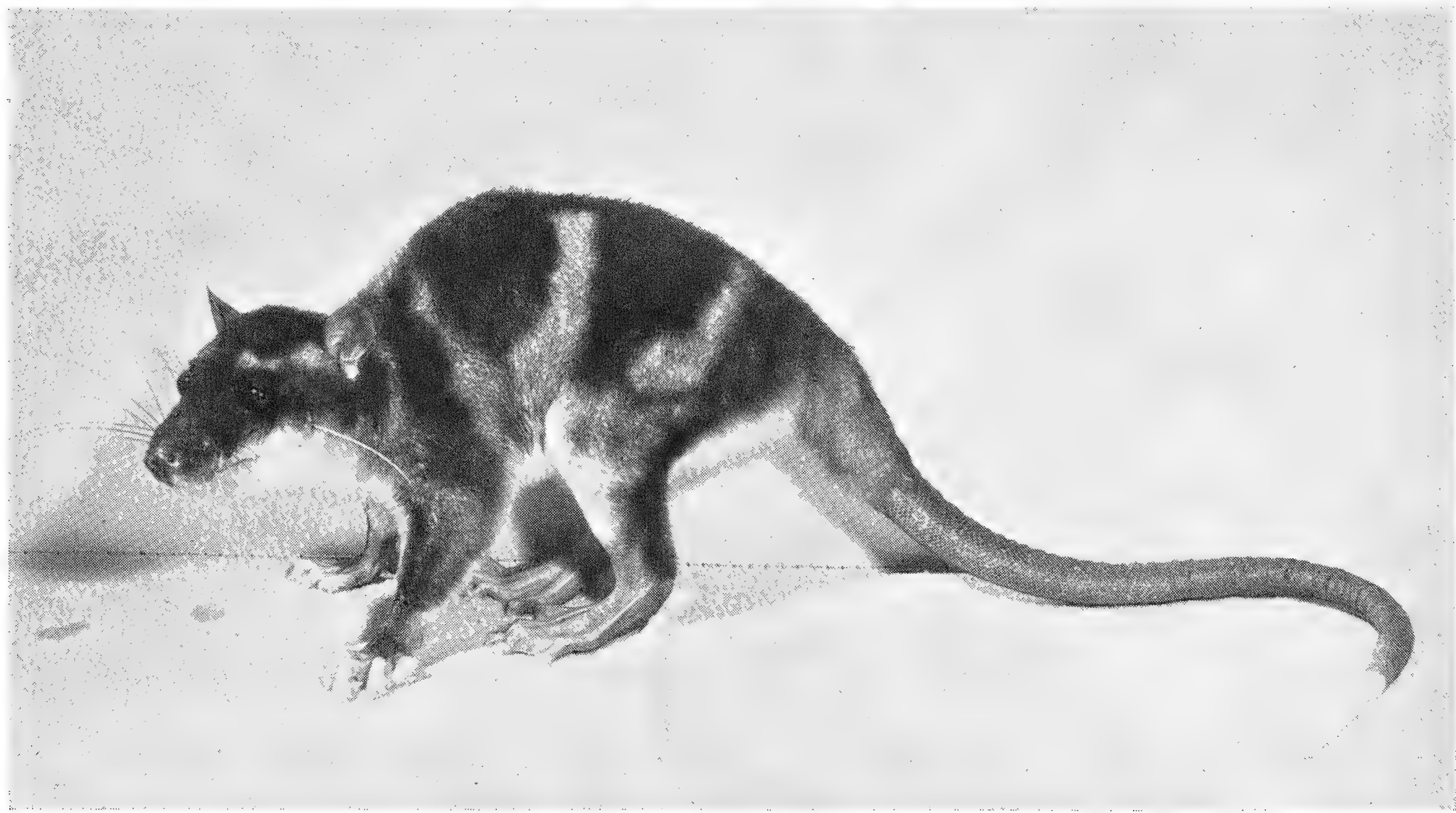
They all testified to the savageness of the Yapock, and I heard of one hunting party that chased it into its hole with three dogs. One dog was badly mauled before they hauled it out. On the other hand, one fellow who had been dynamiting a stream for fish found a Yapock, picked it up and examined it, and let it go; it was probably dazed by the explosion.

Temporarily I abandoned the quest of the Yapock and concentrated on the Sickle-billed Hummingbird and the other small birds I wanted. When I finally returned to San José, my wife met me with a broad smile. Juan So-and-So, a helper I had enlisted in the search for the Yapock at one stage of the quest, had shown up with two Yapocks, a male and a female!

It may be that the male Yapock is by nature untamable; in any event, this one refused the conditions of captivity, even in the commodious box I had prepared, complete with retiring room and water tank. It fought unceasingly, and died. But the female took willingly to civilized life and in a very few days would feed from my hand.

Juan, I learned, had organized a searching party of eight men. They combed the river and tributaries for five nights and on the fifth night they caught the male Yapock.

It took two more nights of hunting before they caught the female, but, as I say, she was tractable and calm and survived the steamer-airplane trip to New York perfectly. There was only one accident; she was carrying two babies in her pouch, and neither survived. How a water-haunting opossum manages to carry her babies in and



The Yapock, or Water Opossum, seemed to be one of those animals destined to exist only in its native streams and in natural history books until Mr. Cordier got on its trail in Costa Rica. He brought back the first specimen ever exhibited outside Costa Rica. It is thriving.

out of water without drowning them, I do not know. I did notice that our female went in and out of the shallow water in her travelling box several times a day, at one time staying in the water a full ten minutes. Subsequently I found one of her babies, dying, in the cage; two days

later a second hairless, semi-embryonic baby was found. I preserved both of them and brought them back for anatomical study. I would have liked it much better if they could have been brought back alive. But Mr. Crandall got one Yapock, anyway.

COLLECTION MADE IN COSTA RICA BY
CHARLES CORDIER AND RECEIVED AT
THE NEW YORK ZOOLOGICAL PARK
AUGUST 31, 1947

NOTE: * New to the New York Zoological Park.
** First time exhibited alive anywhere.

BIRDS

- 1 Cinereous Dove — *Claravis pretiosa* (Ferrari-Perez)
- * 1 Long-billed Star-throat — *Helimaster longirostris longirostris* (Audebert & Vieillot)
- 1 Scintillant Flame-bearer — *Selasphorus scintilla* (Gould)
- 8 Costa Rican Snow-cap — *Microchera albo-coronata parvirostris* (Lawrence)
- * 4 Convers's Thorn-tail — *Popelairia conversii* (Bourcier & Mulsant)
- ** 1 Slender-billed Mango — *Anthracothorax prevostii gracilirostris* Ridgway
- ** 1 Salvin's Sickie-bill — *Eutoxeres aquila salvini* Gould
- 2 Princess Helena's Coquette — *Paphosia helenae* (DeLattre)
- ** 1 Costa Rican Sun Glory — *Heliodoxa jacula henryi* Lawrence
- * 1 Bang's Hermit — *Phaethornis guy coruscus* Bangs
- 2 Violet-breasted Sabre-wing — *Campylopterus hemileucurus mellitus* Bangs
- * 3 Jacobin Hummingbird — *Florisuga mellivora mellivora* (Linnaeus)
- 3 Costa Rican Fire-throat — *Panterpe insignis* Cabanis & Heine
- ** 2 Costa Rican Wood Nymph — *Thalurania furcata venusta* (Gould)
- ** 3 Black-bellied Hummingbird — *Eupherusa nigri-ventris* Lawrence
- 1 Coppery-headed Emerald — *Elvira cupreiceps* (Lawrence)
- 2 Admirable Hummingbird — *Eugenes fulgens spectabilis* (Lawrence)
- ** 1 White-bellied Mountain Gem — *Lampornis hemileucus* (Salvin)
- 7 Costa Rican Quetzal — *Pharomachrus mocinno costaricensis* Cabanis
- * 1 Streaked-chested Woodpecker — *Balanosphora formicivora striatipectus* (Ridgway)
- * 1 Salvin's Barbet — *Eubucco bourcierii salvini* (Shelley)
- * 1 Blue-throated Green Toucanet — *Aulacorhamphus caeruleogularis caeruleogularis* (Gould)

- 1 Black-banded Aracari Toucan — *Pteroglossus torquatus torquatus* (Gmelin)
- ** 2 Costa Rican Nun Bird — *Monasa grandior* Sclater & Salvin
- 2 Yellow-thighed Manakin — *Pipra mentalis ignifera* Bangs
- 1 Velvety Manakin — *Pipra coronata velutina* Berlepsch
- 2 Golden Manakin — *Manacus aurantiacus* (Salvin)
- ** 3 Three-wattled Bellbird — *Procnias tricarunculata* (Verraux)
- 2 Bare-necked Umbrella Bird — *Cephalopterus ornatus glabricollis* Gould
- 4 Blue-hooded Euphonia — *Tanagra musica elegantissima* (Bonaparte)
- 3 Costa Rican Green Tanager — *Chlorophonia occipitalis callophrys* (Cabanis)
- 3 Dow's Calliste — *Calospiza dowi* (Salvin)
- * 1 Tawny-crowned Tanager — *Tachyphonus delatrii delatrii* Lafresnaye
- * 1 Costa Rican Scarlet-thighed Sugar-bird — *Dacnis venusta venusta* Lawrence
- 1 Chestnut-capped Buarremon Sparrow — *Buarremon brunneinuchus* (Lafresnaye)
- 2 Colombian Goldfinch — *Spinus psaltria colombianus* (Lafresnaye)
- 2 Bryant's Siskin — *Spinus xanthogaster xanthogaster* (DuBus)
- ** 3 Salvin's Silky Flycatcher — *Phainoptila melanoxantha melanoxantha* Salvin
- * 1 Costa Rican Silky Flycatcher — *Ptilogonys caudatus* Cabanis
- * 1 Black-faced Solitaire — *Myadestes melanops* Salvin
- 1 Wagler's Giant Cacique — *Zarhynchus wagleri wagleri* (Gray)

MAMMALS

- ** 1 Central American Water Opossum; "Yapock" — *Chironectes panamensis* Goldman
- 1 Woolly Opossum — *Philander laniger derbianus* Waterhouse
- 3 Red-bellied Squirrel — *Sciurus variegatoides* Ogilby subsp.
- 1 White-throated Capuchin Monkey — *Cebus capucinus* (Linnaeus)
- 1 Central American Jaguar — *Felis onca centralis* Mearns

REPTILES & AMPHIBIANS

- 3 Snakes
- 2 Spiny-tailed Iguanas
- 15 Frogs and Toads



Yes, Sir, That's Our Baby!

By LEONARD J. GOSS

Photographs by Staff Photographer Sam Dunton

Andy, the little Orang-utan, has captivated the whole Zoological Park staff. Our Veterinarian's article, and our Staff Photographer's pictures, make it very clear why this happened.

MOST OF THE TIME nobody envies the Veterinarian. But for the past six months I have been told, often, that I am a lucky dog. It's on account of Andy, our baby Orang-utan. I get to watch him, doctor him, play with him, every day.

There is a rumor going around the Zoological Park that very soon Andy is going to be transferred from the Animal Hospital (where he has been quartered simply because he's too small to put on exhibition) to the Animal Nursery. I shall be very sorry to see Andy go, and this article tells why.

Andy came to the United States last June from Borneo — the first post-war Orang immigrant and probably the youngest of his kind ever brought in by an animal dealer. We do not know his age exactly, but he was not far from eighteen months old last spring.

The way these things work out, we knew that quite a large shipment of animals from the Far East had arrived at the animal dealer's farm and that among them was a "young" Orang-utan. We had no Orang in our collection, but neither did we have room for one — unless we were willing to take a very fine young Chimpanzee off of exhibition. Besides, the price was sure to be scandalously high, this being the first Orang imported in many a year.

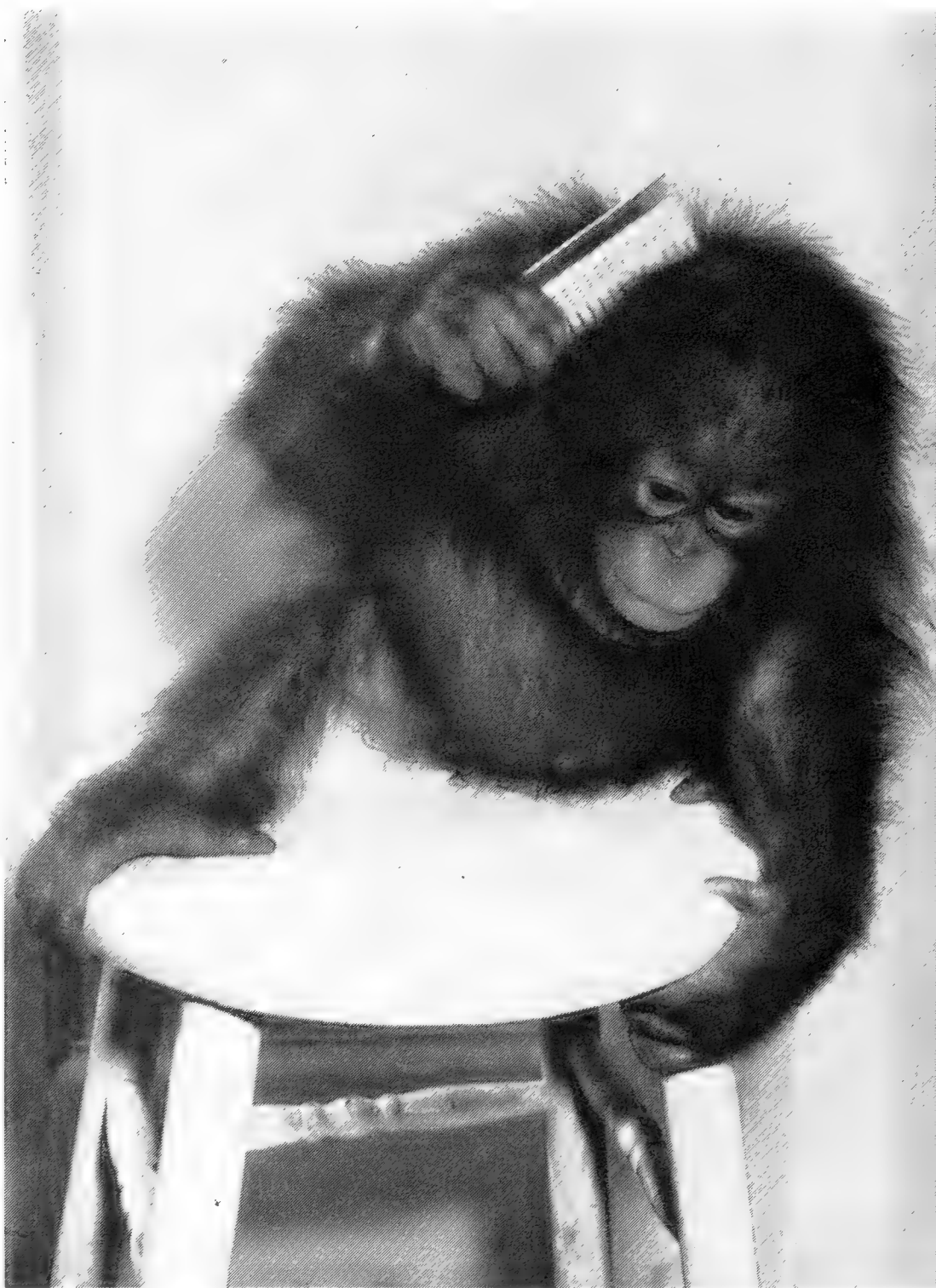
Still, it doesn't cost anything just to *look*, and the dealer had a great many other animals that we knew we wanted. So General Curator Crandall and Curator Eddy ordered out the Zoological Park's station wagon. I was to go along to pass on the health of the specimens. Mr. Bridges went along for the ride.

This particular animal importer's establishment consists of a series of long sheds, all full of birds, mammals and reptiles. We usually go through a new shipment systematically, and there was no reason why we shouldn't have started on the bird building. But somehow we drifted toward the mammal shed where the young Orang would be quartered.

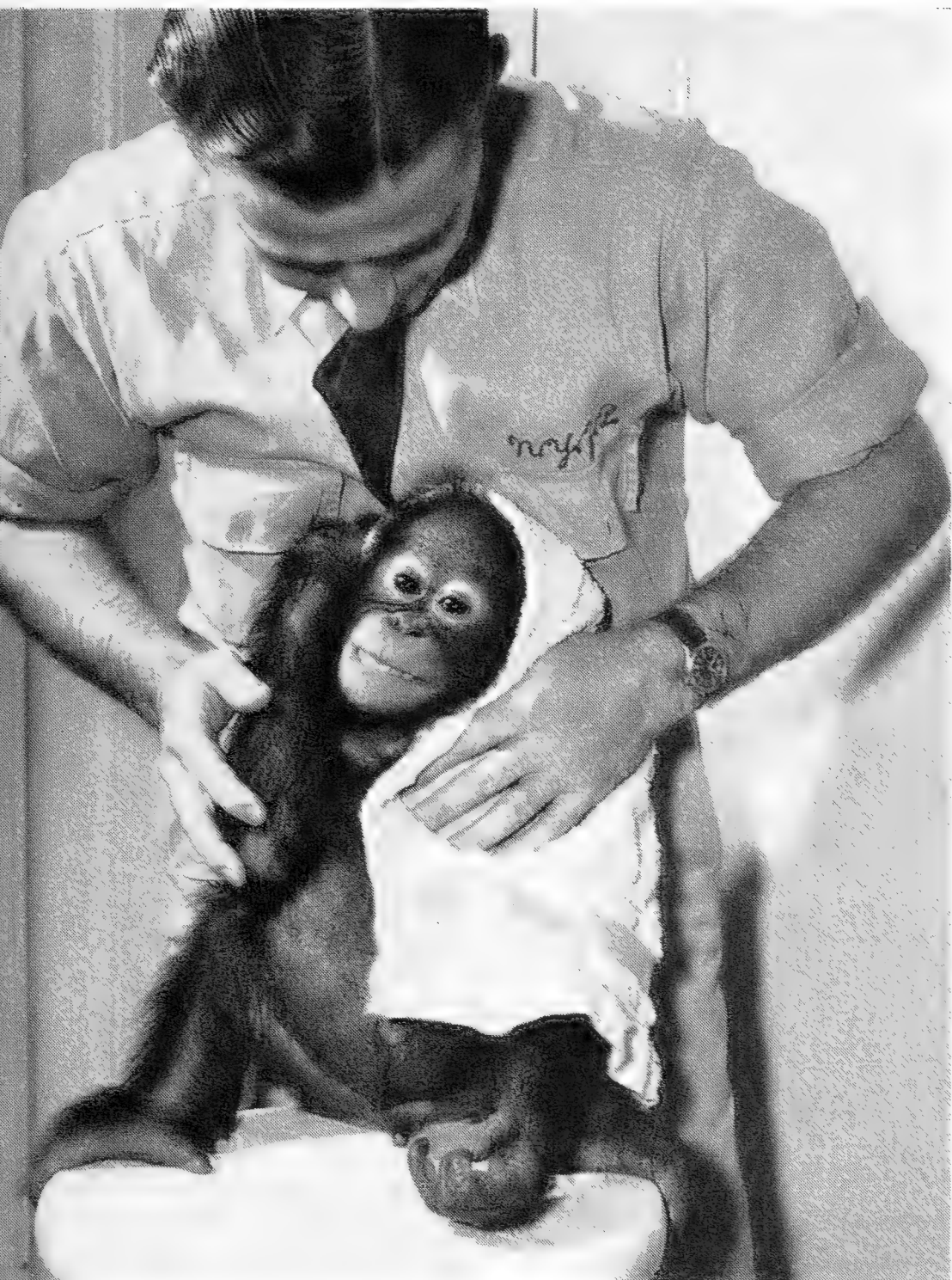
Now, I don't really believe the stage had been



Andy really loves his morning bath—we have it the word of his firm friend, Jim Coder, the Hospital attendant. But there are some rather trying moments



He can't be depended upon to do a thorough job brushing his hair after a bath and a rubdown, but he likes the scratching of the brush and he works hard



Andy is supremely happy when he has had breakfast and a bath and gets a chance to wrap himself in a warm towel. Then he feels at peace with the world.



Andy is supremely happy when he has had breakfast and a bath and gets a chance to wrap himself in a warm towel. Then he feels at peace with the world.

set for us. The importer didn't need to spread his net — and he knew it. But just inside the door in a spot where a shaft of sunlight fell on the face of an iron-barred cage big enough and strong enough to hold a Polar Bear — there was a fuzzy little red-haired head peering out between the bars, and a hairy arm groping toward us.

I wish I had a phonograph record of the noises we made. Talk about women visitors to the Zoo exclaiming "Oh!" and "Ah!" Here was a party of professional animal men carrying on like four maiden aunts around the first baby in the family!

After we got ourselves under control the General Curator made an oh-so-casual question about the price of "Squeaker, here."

It was quite a price.

If Andy had just sat there apathetically, we might have saved ourselves. But to avoid looking at each other when we pondered that price, we looked at Andy and he looked right back, quizzically, waiting, unblinking. Somebody started talking baby talk to him — I am afraid I did it — and Andy responded with an exquisite Bronx cheer. Then he climbed half way up the bars and tried to wrap an old piece of burlap sack around his head, using one foot as a hand. Every now and then, gravely, he would reach out and offer to shake hands.

"There isn't a single Orang in the Zoo," the General Curator remarked, as if we didn't know.

"He's as cute as a bug," Curator Eddy volunteered.

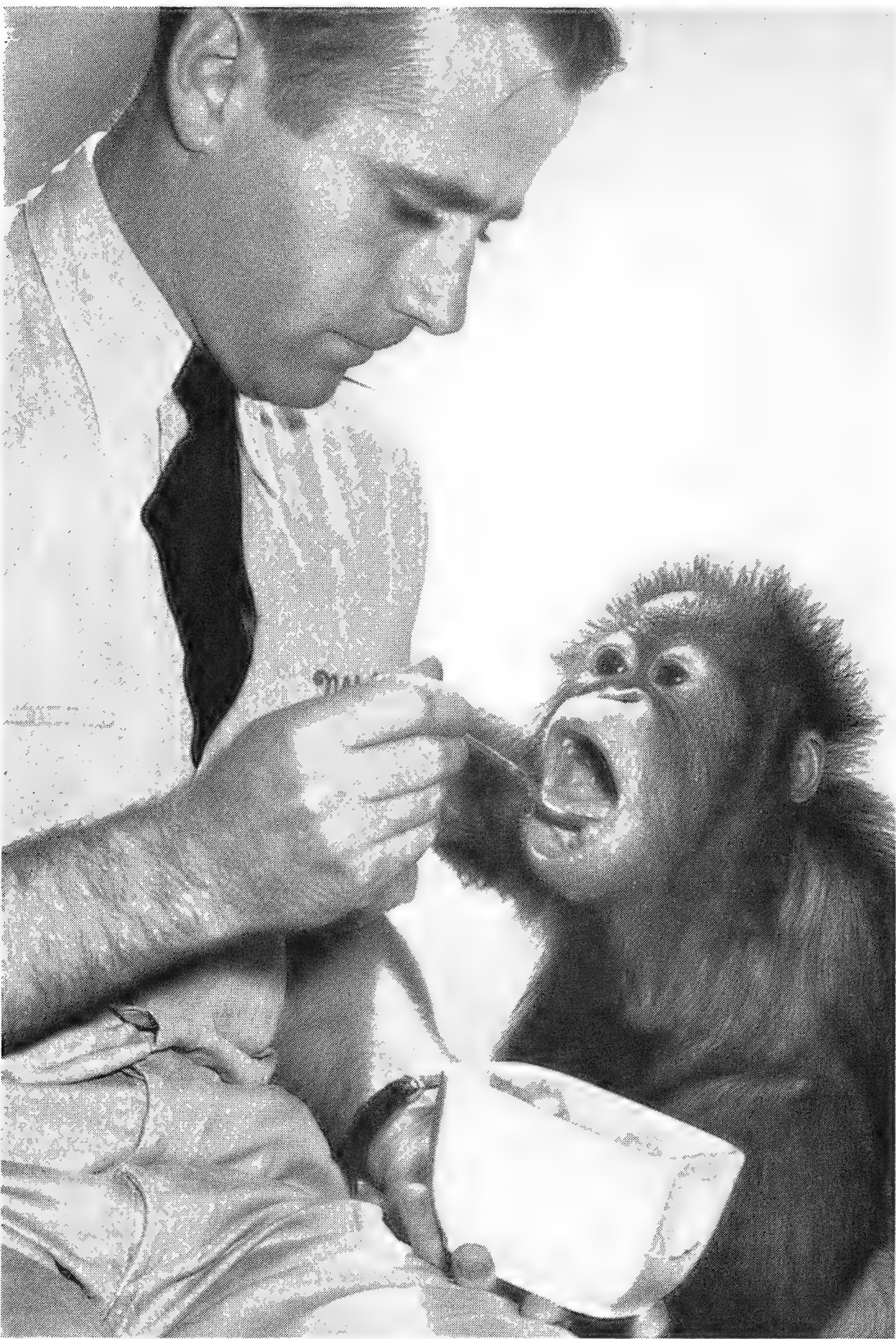
"I can just see the picture layouts he'd make," Mr. Bridges said, talking to no-one in particular.

By this time I was poking and prodding the baby, rolling back his lips to inspect his teeth, parting his hair to see the condition of his skin.

"Well, Lee, you can be sure you'll never find a healthier baby Orang," was my contribution.

In true horse-trader fashion the General Curator turned away and asked if there was anything else in the new shipment, "anything sensibly priced." We looked; said we'd take this, a pair of that, a couple of those. Then the General Curator performed some mental arithmetic and proposed a lump sum *including* the baby Orang.

It was the dealer's turn to splutter and carry on about the cost of collecting and transporting animals, and he did, admirably. But in the end he unfastened the cage door and Andy was ours.



▲ As long as he has no reason to suspect that a pill is hidden in his food, Andy will open his mouth for food.

This is proof that Andy is getting enough to eat. It's just after breakfast—he hasn't swallowed a watermelon. ▼

There was no question about leaving *him* to be delivered to the Zoo next time a truck was coming our way; a small box was called for immediately and Andy was bundled into the station wagon right beside my feet. All through the trip I could feel a tugging at my trousers leg or a soft little hand picking at the ring on my finger.

A big quarantine cage in the Animal Hospital was empty and clean. Andy went into it willingly, but he insisted on taking along the six-inch square of filthy burlap that had served him all the way from Borneo as a toy, companion and comforter. Where Andy went, there went the burlap in one hand or dragged behind with a foot. But while he was enjoying his first meal with us — a glass of warm milk — he relaxed his hold for a few minutes and when the glass was empty he found himself in possession of a small, and clean, turkish towel. Since then he has had a succession of them, three a day. Whether his devotion to a towel wears off as he grows older, remains to be seen; as I recall, *I* didn't give up my teddy bear until I was shamed into it when I started to kindergarten. Andy obviously looks upon that towel as a friend and protector, and child psychologists from the Yale Clinic, who visited the little Orang some weeks ago, were interested in his attachment to it. Many children show a similar devotion to a particular cover, or toy.

Andy left no doubt in our minds about a routine. We knew he would want a bed of some kind, and a clean apple box was just the right size. The box was put in the cage immediately



after the milk feeding, and just as promptly Andy inspected it deliberately and unblinkingly, found it good, and crawled inside. He dragged the towel in with him, of course, pulled it over his head, and went to sleep.

With our baby tucked away for the night, Nurse Ruby Murin, Hospital Attendant Jim Coder and I sat down to work out a feeding schedule. Our best guess was that Andy was about eighteen months old, and so on the theory that what was good for a human baby of eighteen months would serve for an eighteen-months-old Orang, we made the following schedule:

- 8:30 A.M. Cereal (5 heaping teaspoonsful in 2 cups of milk, plus 3 drops of vitamins)
- 11:00 A.M. Tomato juice or orange juice (1 cup)
- 1:00 P.M. Strained vegetable or baked potato; 1 apple, orange or banana; 1 piece of bread
- 4:30 P.M. Cereal (3 teaspoonsful in 1 cup of milk), to which is added one fresh egg (poached, boiled or raw) on Monday, Wednesday and Friday

Overnight we bought a supply of canned baby foods and the next morning Andy's new life really began. He was weighed: 10 pounds, 13 ounces. He seemed a little weary — as who wouldn't, after such a long trip? — and we gave him two days of rest before making the routine Hospital physical examination. Everything was in order with one exception. Hair, skin, teeth (twenty of them), bone development (as revealed by X-ray examination), ears and nails were all fine, but he was carrying a moderately heavy intestinal worm infestation. I decided against any drastic medication for this, since he would normally eliminate them entirely, in time, if we took care to prevent reinfestation.

His care and feeding were purely routine for a while, and then Jim Coder found that Andy could not digest fresh milk but that he did very well on evaporated milk diluted with an equal part of water. That was only a minor hurdle, but on September 15 he came down with a severe amoebic diarrhea.

This called for immediate medication, one tablet morning and night for two weeks. In our wisdom we decided simply to push the pill down Andy's throat before breakfast and to repeat be-

On dull days Andy gets a sunlamp treatment, complete with goggles which he generally transfers to his mouth. He likes the warmth.

fore the 4:30 feeding. The first pill did, indeed, go down as planned, although Andy was displeased, surprised and disappointed in his friends Coder and Goss for treating him so.

Four-thirty o'clock came, and Andy blandly refused to open his mouth or to allow it to be opened. At this point I admit that many persons will find it hard to believe that two normally robust adults cannot hold a ten-pound baby Orang-utan long enough to place a pill well back on his tongue. To those of us who tried it, it is even harder to believe that it *can* be done. An Orang has two hands and two feet, but for pill-repelling purposes they are all hands. Not only that, but the arms and legs are rubber. While these rubber bands are winding and twisting, all four hands clutch at anything within reach. Andy's head and neck twisted and turned and the





▲ The night Andy got out of his cage and liberated the Hospital's mice, he cut his foot on a piece of broken glass — glass which he had broken, incidentally. Babylike, he puts the foot in his mouth and tries to look so

◀ First step in healing Andy's foot was to soak it in a warm solution of Epsom Salts. Andy took a vast interest in this procedure, carefully testing the warmth of the water before putting his foot in the soaking-pot

The bandaging, too, fascinated him, and he paid strict attention to the wrapping and the application of adhesive tape. It always pleases him when someone fusses over him, no matter what the reason for the fuss. ►

Then the inevitable happened. Andy hadn't been back in his cage more than two minutes before he began picking at the bandage and in five minutes he had the tape loose and the whole bandage was off his foot. ▼





When Andy swings, he swings with utter concentration and every ounce of his 19 pounds goes into the effort of getting violent exercise.

only rigid part of his body was his mouth — and it was clamped shut.

Maybe a comparison will give the idea: if you tie a tiny padlock on the topmost branch of a pine tree and then try to unlock it on a windy day with a key a hundred times too large — and the key dangling from the end of a bamboo pole — well, that's the way it is when you try to get a pill down the throat of an uncooperative baby Orang-utan.

We gave up. At breakfast, I said, he is always ravenous; we'll simply grind up the pill and mix it with his cereal.

Andy climbed into his feeding chair and sat with his mouth wide open for the first spoonful. It went into his mouth, but no further for several minutes . . . then he swallowed it, but he ab-

solutely refused any more of the cereal. So we tried another tablet powdered and mixed with his warm milk. No. Our next trick (for we *had* to prove Man's superiority somehow) was to conceal a whole tablet in a spoonful of food, offer it to Andy, and then ply him with his favorite delicacies in quick succession. But of course Andy detected the pill instantly. He mulled it around in his mouth, took it out and looked at it several times, and finally handed it to us.

We thought we had won when, after going through this routine a dozen times, Andy did not give us back the pill but instead accepted spoonful after spoonful of food and even drank his milk.

Then he pulled the pill out of some recess of his cheek and handed it to us.

Eventually we found a way to circumvent him by dividing the tablet into eight minute pieces, hiding them in food, and shovelling it into him so fast the pill was down before he knew it.

Oddly enough, when Andy's condition did not improve after ten days of dosing with pills and I had to change to a stronger preparation containing arsenic, he took to the medicine without a single protest and in ten more days made a nice recovery.

I will skip the details of the worst week of his illness, when he was a very sick baby and seemed to know it. His friend Coder was on vacation and I was his next-of-kin. Food simply would not stay with him, and he was calling constantly for someone — for me — to come and clean him and his cage. He was miserable and he wanted affection, and each time his door was opened for cleaning, he promptly crawled into my arms. The Zoo's laundry worked overtime on hospital jackets.

But he did recover, perfectly, and then he celebrated by picking the lock of his cage and roaming the Hospital one night. He knocked bottles off the shelves and worst of all, opened other cages and let out two large families of mice that were awaiting their turn to go on exhibition. I must say that Andy *looked* repentant the next morning.

On several occasions I have visited Andy at night and invariably find him sound asleep. He usually opens one eye, sometimes both, for an instant, and then goes back to sleep. If I leave the lights on too long he covers his eyes with his

towel, and in a few minutes is snoring again — a gentle, low, rhythmic snoring.

A few times we have tried interrupting his routine, by taking him out of his sleeping box after he goes inside after the 4:30 P.M. feeding. It *can* be done, but it takes some doing. When he is sleepy, he is determined to sleep, just as he is determined about everything in his own private little routine.

When he wants something, he lets us know by a little squeal. When he is happy and playful he gives a Bronx cheer at frequent intervals. Now and then when his routine is interrupted, such as by putting him back in his cage after breakfast instead of letting him climb a chair and supervise his friend Coder's work, he throws a tantrum during which he either beats his hands on the floor or scrubs them furiously on the concrete while making deep, husky, bark-like sounds. These fits of temper are short-lived if you ignore them, but if you stop work to watch him and try to "talk him out of them," they will go on in-

definitely. Never does he attempt to bite, even when being forced to do something very much against his will.

His morning bath and grooming are very much to his liking. Even washing his ears and his unreasonable facsimile of a nose are all right, although he winces when Coder rubs his ticklish spot, just over his ribs.

The high spots in Andy's life so far have been the elementary intelligence test given him by the visiting experts from the Yale Clinic — they found him amazingly like a human child in many of his reactions — and a mock game of gin rummy he played with Oswald Jacoby, the bridge expert, for the benefit of a press agent.

On October 29 he took his first step, upright, alone, no hands. Jim Coder observed the event, and came bursting into my office with the news. He is gaining weight, too; about 19 pounds now.

Yes, we are going to miss Andy when he leaves us. In case you don't find Jim Coder or me at the Animal Hospital, try the Nursery.



The end of the day comes immediately after the 4:30 P.M. feeding. Dragging his towel behind him, Andy crawls into the open-sided box that serves as his bed, wraps himself methodically in the towel, and quickly goes to sleep. Disturbed, he opens his eyes only briefly.

Seal Management Has Paid Dividends

By **BEN EAST**
Field Editor, Outdoor Life

YOU HAVE HEARD of the Fur Seals of the Pribilof islands. Perhaps you know that the horde of pelt bearers that goes ashore each summer on those misty land dots in Bering sea 250 miles northwest of Dutch Harbor constitutes the greatest concentration of wild mammals remaining on the earth; that the eyes of this generation have beheld or will behold no more stirring wildlife spectacle. But do you know also that the story of the seal herd is the most dramatic success story in the history of wildlife conservation? From an estimated low of 125,000 animals in 1911 to more than 3,000,000 in 1947 — that is the record of what adequate protection, sound management and sane utilization have done for the fur seals.

Visitors are rare on the Pribilofs. In the interests of safeguarding the seal herd and protecting it from disturbance, the islands are closed to commercial ships of all kinds and tourists are banned. Only those go ashore who have legitimate business there. It's an unfortunate but necessary rule. If outsiders were permitted the run of the Pribilofs the sealing industry would hardly last a single summer and the seals would be driven off in a season or two.

The visitor who does go ashore, however, whether he be government official, visiting biologist or wildlife photographer, sees an incredible sight.

He looks upon beaches teeming, thronging, packed with animal life. The seal rookery areas begin at the water line and extend back across the rocky beach for varying distances, averaging from fifty yards to a quarter-mile. A single rookery may run for a mile or two along the shore. Over all that area the ground literally crawls with seals.

Sleek, mild-eyed cows lie in groups and clusters, all but touching one another. Their numbers defy counting. The visitor cannot hope even to estimate how many cow seals he sees on a given stretch of beach. They are present by the thousands and tens of thousands, lithe, graceful, yellow-brown creatures with silver gray throats and overlying shades of gray in their pelts.

Scattered through the huge, restless concentration of sea mammals, at irregular intervals of a few yards, the bulls bulk big and dark and ugly.

They are the harem masters, weighing 300 to 400 pounds in contrast with the average weight of about 70 for the cows they rule, and they tower above the close-packed harems like big black stumps studding the beach. Watching them, it is easy to understand why the Russian sealers slaughtered these animals for nearly a hundred years under the name of sea bear.

Among the cows and bulls, scattered in cran- nies and spaces between the boulders, are countless thousands of shiny, jet-black pups, crawling,





All photos by Ben East

Catwalks and tripods like this enable government agents to reach vantage points above the harems to observe and count the Fur Seals. The rookery begins at the very edge of the water.

playing, bleating like weak-voiced lambs. Looking down upon a dense mass of these infant seals, they resemble nothing as much as overgrown black maggots, so tightly do they pack together and so endlessly are they on the move.

Once the newcomer to the Pribilofs has watched for an hour or two the ceaseless activity

of the seal harems, has listened to the bawling and barking and bleating from thousands of animal throats rising and falling in an irregular rhythm, he begins to doubt his own senses. The spectacle before him, he tells himself, is unreal, a wildlife fantasy from another world. And small wonder he believes that. He is watching a dis-



A bull Fur Seal mounts sleepy guard, in the background at the right, over the cows of his little harem. Some of the shiny, jet-black, bleating pups are scattered among the cows.

play the like of which he could find no other place on this planet today, an exhibit of wildlife in wholly primitive abundance. He is looking upon a scene but little changed since the days when the first of the Russian fur hunters stood on those same beaches and studied with greedy, calculating eyes this great natural storehouse of pelts.

There were some 4,000,000 to 6,000,000 seals then, perhaps more than that. The number has been estimated as high as 10,000,000. There are 3,000,000 now. The rookery areas are not as extensive, but they are fully as crowded.

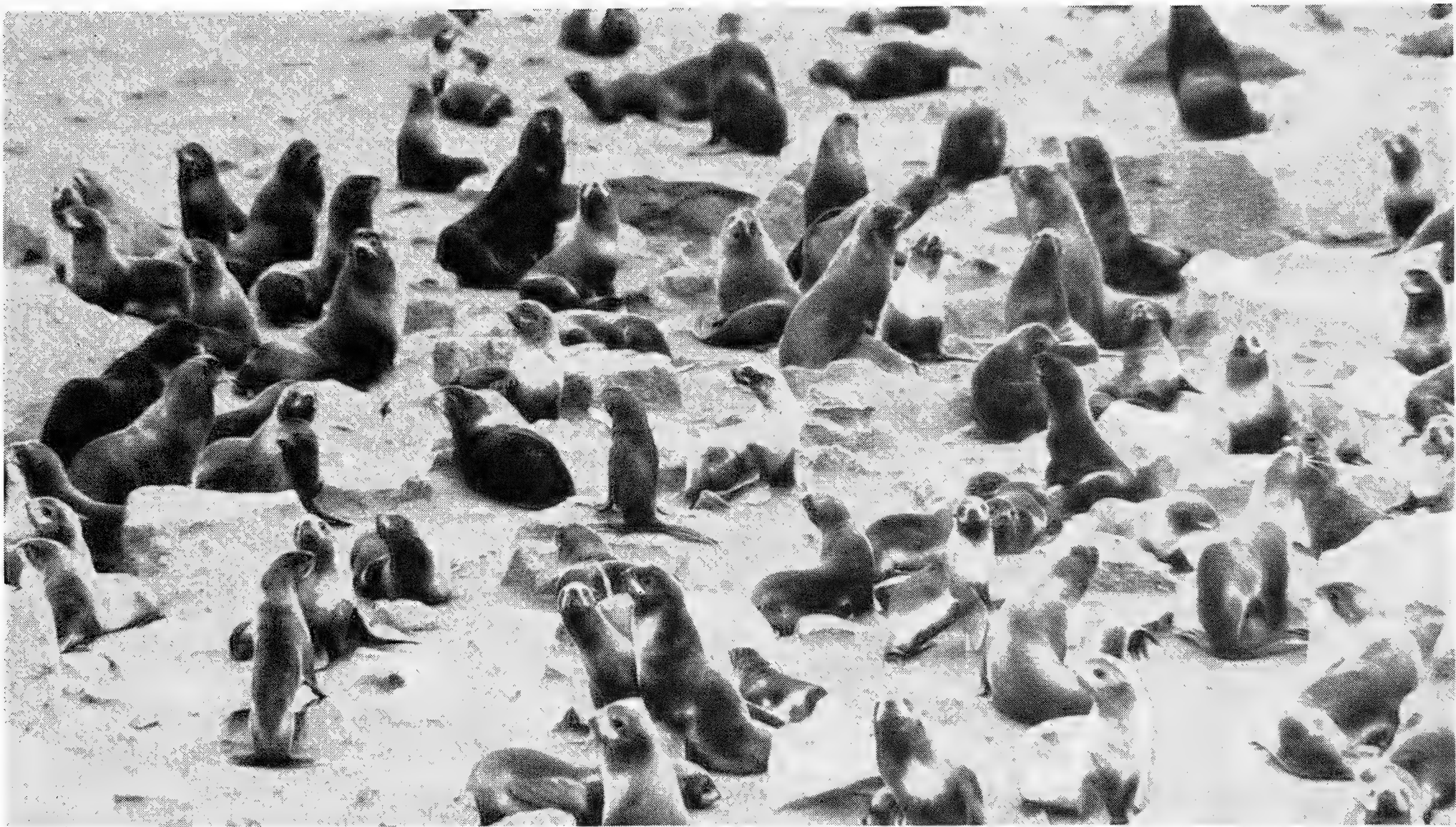
It was in the summer of 1786 that Gerassim Pribilof, a Russian navigator and adventurer, headed his small ship north into the foggy wastes of Bering sea to look for the summer home of the great Alaskan seal herd.

The fur trade of new-found Alaska, discovered only 45 years before, was rolling into high gear. Russian ships sailed out from Kamchatka for the Aleutians, wintered there and returned home the following summer with holds bulging with pelts. For the most part it was the glossy, silken skin of the Sea Otter that was taken. A few Blue Foxes figured in the trade, along with

a modest catch of Fur Seals, but the otter of the kelp beds ranked far ahead of all the others.

Now Pribilof set out to seek a new source of profit for the fur hunters and the distant court of Russia. The otter hunters and traders had seen great numbers of Fur Seals moving south in autumn through the narrow Aleutian passes, returning north in spring. But no man knew the location of the summer home of the sea bears, the place where they went ashore at the end of the winter migration, where they bred and reared their young. He who found that place would have wealth untold. Somewhere in the foggy north, the Russians reasoned, a fortune in pelts such as no man had known was waiting. Many had searched in vain. Pribilof had better luck.

From the deck of his small sailing vessel, early in June, he saw the steep cliffs and treeless green hills of a rocky island rising out of the fog of Bering sea. He landed and named the place St. George. The summer home of the seal herd had been discovered. On the rock-strewn beaches the Russian found the greatest concentration of fur-bearing animals the eyes of white Europeans had yet looked upon.



Young bulls, or bachelors, are gathered by themselves on their hauling grounds, awaiting the time when they will have attained the size and the strength to create harems of their own.

The island was without human inhabitants and Pribilof could find no evidence that a primitive people had ever dwelt there. Laborers were needed to work the fur mines. He hurried back to the Russian settlements at Unalaska and Atka, recruited a band of Aleut Indians, returned to St. George and put them ashore as colonists to kill and skin seals. Since that day the Aleuts have been the "natives" of the seal islands and since that day they have done the work of sealing, at first as wretched slaves under brutal Russian masters, then under American managers who treated them only a little better and finally under the benevolent direction of the United States government which, in recent years, has made their villages the best native communities in Alaska.

A year passed before Pribilof's little colony of Aleuts chanced to see the low hills of the second and larger of the two seal islands, St. Paul, rising out of the sea thirty-five miles away in the northwest. There seals were four or five times as numerous as on St. George.

Now the kill began, the greatest mass slaughter in the history of the fur trade. The early Russian sealers knew no law save that of greed. In

twenty years they reduced the herd to a point where its very existence was threatened. In 1806, two decades after Pribilof had first seen the "living beaches," it became necessary to halt seal killing outright for two years to save the animals from extinction. It is to the credit of the Russian traders that they enforced the ban, too.

In 1834 a second crisis arose and again all sealing was stopped. By that time, 48 years after the discovery of the islands, the Russians had shipped home 1,821,000 sealskins, if the old records can be relied upon.

It was in connection with the sealing holiday of 1834, when the herd had shrunk to such low levels that the Aleuts were not even permitted to kill for food, that the Russian managers of the Pribilofs stumbled upon the key to sound management of the great herd. Twice in less than 50 years they had seen their pelt industry sink down to the threshold of bankruptcy. They had learned a lesson. When killing was resumed it was limited to bull seals only.

That same rule has continued unbroken in effect down to the present day. It has been more than 110 years since cow seals have been slaughtered for their pelts on the islands. Even in the

lawless period following American purchase of Alaska that one prohibition was respected.

The seal herd prospered under this simple system of management. In 1864, three years before Uncle Sam acquired the Pribilofs, the Russian sealers reported 2,000,000 to 3,000,000 seals summering on the islands. They considered the herd capable of yielding an annual harvest of 80,000 to 90,000 skins without damage to the breeding stock at that time.

The total Russian kill up to the time of the American purchase in 1867 had been some 2,400,000 seals in a period of 80 years. The sea bears had had no easy time of it in the decades between Pribilof's voyage and the Russian sale of Alaska. The new ownership brought even sorrier days to the great herd.

Conservation was an unknown word in this country then. We were launched upon the period of the Great Slaughter, the era that saw the Bison herds decimated, the Passenger Pigeon hosts wiped out, the Eskimo Curlew exterminated, the Egrets all but finished, the Upland Plover pushed to the very brink, the Elk and Wild Turkey destroyed over most of the eastern states, the Sea Otter harvest completed.

No one gave thought, in the beginning, to protection for the Fur Seals on the distant Pribilofs. As a matter of fact, American law of any kind was slow to penetrate the newly acquired territory and for the first two or three years might was right and the ruthless ruled. Besides, we had acquired Alaska to exploit, not to save, its natural wealth.

In 1868 the seal kill was close to 300,000 animals, more than threefold the take the Russians had considered justified. But even in that reckless summer the kill was confined to males, chiefly young bachelor bulls. The reason for that astonishing observance of the first rule of sound regulation was simple. The Russian masters of the islands had planted the tradition of protecting the cows in the minds of the Aleut killers so firmly that they refused to disturb the harems, or to club female seals.

In 1870 sealing came under control when the Alaska Commercial Company, a powerful trading organization, was granted an exclusive twenty-year lease to take skins on the Pribilofs. The

lease provided for a quota of 100,000 seals each summer. The company had no difficulty in filling its quota up to 1883. By that time the great herd was shrinking again under the impact of pelagic sealing and it was increasingly difficult to take 100,000 annually. In 1889 most of the kill was two-year-old bachelors, slaughtered to make up the quota. A year later the industry collapsed. The 1890 harvest was 20,000 pelts.

In the period of its lease the Alaska Commercial Company had taken a total of 1,977,377 seal skins on the Pribilofs and had paid back to the United States government in taxes and royalties \$6,020,000. "Seward's folly," the scorn of the nation when the Alaskan deal was made, was folly no longer. Two tiny dots of rocky, fog-ridden land in Bering sea had come within \$1,180,000 of repaying the cost of all of Alaska. In the next 20 years those same islands were to yield an additional \$3,454,000 in seal royalties.

Meanwhile, the herd was facing a new threat, a menace graver than any it had confronted in all the bloody years of the pelt trade. Pelagic sealing, killing in the open sea, was under way at last.

The first sealing schooners put to sea in 1879. The fleet was small that first summer. Only five vessels harried the great herd. But they showed a neat profit and they operated on the high seas where regulations did not exist. The fleet grew fast. By 1891 it numbered 115 ships, each carrying from five to twenty boats and ten to fifty hunters.

The sealing schooner carried boats or canoes on her open decks, manned by white or native hunters. Cruising the waters around the Pribilofs in summer and all the wide reaches of the Pacific at other seasons, she put her boats into the water whenever the weather was fair and hunted down seals wherever she could find them.

The Indian sealers used canoes and took their quarry with spears, paddling stealthily up to the seal as it slept or idled at the surface and thrusting home the harpoon. The white hunters preferred boats, and rifles or shotguns loaded with buckshot.

The fleet followed the herd, from the latitude of Seattle to the Pribilofs and back again, and crossed the Pacific to take toll of the lesser herds



A truculent bull dares the cameraman to come nearer—and he means it, too. These big bulls are relatively enormous in comparison with the cows—they weigh between 300 and 400 pounds, while the cows average only about 70 pounds. The bulls tower high over the harem.

on the Asiatic side as well.

From 1879 to 1897 pelagic sealers took 636,788 pelts from the Alaskan herd and 256,259 from the Kurile and Commander island herds along the coast of Russia and Japan. In addition, another 100,000 skins were taken from locations never reported. The grand total of the harvest in those eighteen years was just under a million seals, all taken at sea.

And those figures do not begin to tell the story of the bloody business. Pelagic sealing was the most wasteful method ever used to take a harvest of fur. For every seal they retrieved, it was estimated later, the schooner crews killed and

lost three or four. Six of each ten they killed were cows — and each cow destroyed meant the loss of two seals! Either she was carrying an unborn pup or she left a young pup to starve on the Pribilof beaches.

The total loss to the herd from pelagic sealing will never be known. In Bering sea alone, from 1880 to 1911, the fleet marketed 900,000 skins. From 1890 to 1911 more seals were taken annually at sea than were killed on the clubbing meadows of the Pribilofs — and three or four were lost for each one taken.

From 1890 to 1910 sealing rights on the islands were in the hands of the North American Com-

mercial Company. In the twenty years they contrived to take only 342,650 pelts.

Continued looting of the great fur storehouse by the pelagic fleet stirred American anger at last. Heated controversy flared between the United States and Great Britain in 1890, when we sought to establish jurisdiction over Bering sea as closed waters, and seized a fleet of Canadian sealing vessels operating there.

The international incident went before a Tribunal of Arbitration three years later and dragged along until it was finally settled by the famous pelagic sealing treaty of 1911, under which Great Britain, the United States, Russia and Japan agreed to abolish sealing on the high seas. The countries that owned no seals did not give up their privileges for nothing. Under the treaty Russia and the United States agreed to pay Great Britain and Japan each 15 per cent. of the annual revenue from their seal herds and Japan in turn promised to pay Great Britain, the United States and Russia 10 per cent. each of the yield from her small herd in the northern Kuriles.

Recent developments in world politics and world history have altered the arrangements somewhat, but we still send our British installment to Canada each summer.

And now, Uncle Sam was in position at last to control and manage the seal herd. True, there wasn't much left to manage. The take of pelts

in 1910 had been 12,000. An equal number was harvested in 1911. By that time the best estimates fixed the herd at 125,000 animals, a thin and tattered remnant of the vast, primitive horde of 1786. The future looked dark.

In 1912 all killing was halted for a period of five years, and the seals began their shuffling trek along the comeback road. The rest of the story is known to every American schoolboy.

Killing was resumed in 1917, under painstaking regulation. A harvest of skins has been taken each summer since, save for the year of 1942, and the ban of that season grew out of military necessity rather than considerations of conservation.

The kill is limited to three-year-old bachelor bulls. In 1943, for the first time since 1889, the harvest mounted above 100,000 skins. The annual census, made by government counters at the end of the breeding season each summer, indicates that the herd now numbers in excess of 3,000,000 bulls, cows and pups and is increasing year by year. The sight that Pribilof saw, on the rocky beaches of St. George in 1786, is well on the way to being duplicated once more.

Incidentally, had we acquired nothing in the Alaskan purchase of 1867 save the lonely, fog-draped islands of the seals, it would still have been a fabulously profitable real estate transaction!

THE New York Zoological Society was in the thick of the Fur Seal fight in the early years of this century when legal protection was thrown around the Pribilof herds. The late Dr. Charles Haskins Townsend, director of the Aquarium, battled vigorously to control shore killing and especially to stop the ruinous pelagic hunting.

Dr. Townsend was an informed expert. In 1886 he had been the government naturalist on the U.S.S. *Corwin* when it made a survey of the wild life of the north Pacific, and thus he saw with his own eyes what was happening to the great seal rookery populations. He came back from the Pribilofs convinced that only the most heroic measures would be able to save the Fur Seals and the industry based on them.

He pressed his arguments so hard that he was appointed as a member of the Bering Fur Seal Commission, and was made a Federal Inspector to enforce the regulations when the North American Commercial Company was licensed to take seal skins.

In 1902 Dr. Townsend was "borrowed" from the Zoological Society by the Federal government, and was sent to the international tribunal at The Hague, where international friction over off-shore killing was being adjusted. His ideas about shore slaughter were adopted, but he was not immediately successful in his efforts to stop pelagic hunting and he campaigned in Washington and through the Zoological Society's magazine until the 1911 treaty actually halted it.

We Are Far from Complacent

By DONALD T. CARLISLE

NINETEEN-FORTY-SEVEN has been a rather remarkable year for the Zoological Society. Starting with a highly successful Annual Meeting in January, attended by more members than ever before, we have carried on through the year at an equally exhilarating rate of speed. Many rare animals besides the widely publicized Duck-billed Platypuses have come to the Zoo — a number of them never having been seen here or anywhere else before. The Park has been greatly improved by the beautiful renovation of the Small Mammal House, the intricate Platypusary, Bird Rock and a long list of other improvements that are less obvious but which have added importantly to the Park's beauty and interest.

Beyond these tangible evidences of progress there have been notable advances on the scientific front. During the summer a squad of young biologists worked in the Park on a series of studies in animal behavior. Another group under the direction of Dr. C. R. Carpenter conducted similar research projects at the Jackson Hole Wildlife Park. This Park, by the way, is progressing rapidly towards the day of public opening in 1948. Fences and roads are installed and the areas are nearly ready to receive the herds of bison, moose, elk, deer and antelope that will eventually live therein.

In the laboratories of the Aquarium the staff is busily carrying forward its regular projects, particularly those relating to the genetics of fish and the electro-physical properties of the Electric Eel. Additionally it is undertaking work made possible by three separate grants from the National Cancer Institute, made to the Society this fall.

Plans go forward daily on the New Aquarium, the Aquarium staff and the architects holding frequent meetings every week to determine the

multitude of details that enter into the construction of this magnificent new institution to be under the Society's direction.

Early in 1947 the Conservation Division of the Society was inaugurated with a staff of four administrative officers occupying their own quarters at 122 East 58th Street, and by the first of the year this group will be able to announce a program of international importance in behalf of conservation.

All these events have been chronicled in ANIMAL KINGDOM, but their aggregate volume has probably not been apparent to you, reading about them as you have month by month as the year has passed. We believe it is fair to say that this has been as active a year as the Society has ever spent. In its range our program has probably been the most comprehensive to date.

Yet we are not complacent about all this accomplishment. Much remains to be done.

For one thing, we need many more new members. You will perhaps be interested to know that over 1,000 new members joined the Society in the first six months of this year — by far the largest number to join in any equal period in the past. In the first year of its existence the Society had but 124 members. By 1899, the year the Park was opened, our membership had grown to but 767. It is significant of the growth in interest therefore that the Society's membership has more than trebled in the last two years.

However, the Society should have a membership of at least 10,000. This Society operates the City's most popular institution — the Zoological Park — with an attendance of 2,500,000 to 3,000,000 people every year. When the New Aquarium is in operation an equal attendance is expected there. Thus your Society will then be responsible

for two great institutions used by over 5,000,000 people every year.

The Society's work in the fields of the biological sciences is growing and increasing in value to the public. In the world of education we are developing a program in collaboration with leading educators that will bring the Society into far wider and more direct school and college contact than ever before. In the matter of our conservation effort, we hope soon to be able to make the most significant announcement in our history.

These are all reasons why people should join us, and give their moral support to these vitally important programs. Since the best friends of the Society are naturally its members, we urge you, our friends, to help us increase our membership. We would feel that the Society is on really safe ground if we could increase the membership to 7,500 by the end of 1948 — and on the basis of our past experience, we know that this is by no means an unreasonable goal.

At Christmas, 1945, we made our first appeal for memberships as presents — especially as gifts for youngsters. A fairly good response caused us

to repeat the appeal again last year. Once more a gratifyingly large number of members sent in gift enrollments. Therefore — particularly because we have gained so many more new members since January 1 — we urge that you make presents of memberships this coming Christmas-tide.

The gift of a membership is an unusually valuable present. It consists of so many interesting things — tickets to the Annual Meeting and the Spring Garden Party; special members' previews of new exhibits at the Park; not only free admission to the Park on pay days but passes for all pay events and guest admission tickets. In addition every member receives *ANIMAL KINGDOM*, the beautiful *Gallery of Animal Portraits*, and a 20% discount on all Society publications.

A membership in the Society lasts all year, remember. It is so simple to make. No shopping required. Just send in the names and addresses of the people to whom you wish to make this present. A card will be mailed them announcing your gift in time to be included in the Christmas stocking.

New Members of the New York Zoological Society

Since the Last Issue of *ANIMAL KINGDOM*

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BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Platypuses In Winter Storage

Cecil, Betty and Penelope, our three Duck-billed Platypuses, were put in "winter storage" in the basement of the Bird House on October 27 and will not be on public exhibition again until next spring — probably around the first of May. Even though they hibernate in parts of Australia, General Curator Crandall feared that a New York winter might be too cold for them.

All three animals refused to feed in their out-of-doors Platypusary just before they were put in winter quarters, probably because the water in their swimming pool was too cool. They started eating immediately when they were taken indoors.

The three Platypuses were brought to New York on April 25 by Mr. and Mrs. David Fleay, and on April 29 went on exhibition for one hour a day. During the summer they ate about 2,000,000 earthworms and 16,000 crayfish, and were seen by 203,841 visitors.

Conference in Mexico

The First Interim Conference of the International Council of Museums was held in Mexico City from November 7 through November 13 and the Zoological Society was represented by Mr. Harold Coolidge. The purpose of the International Council, which was formed in November, 1946, is to provide an organization to further international cooperation among museums, zoological gardens and botanical gardens, and to be the coordinating body furthering the interests of such organizations. It has already been recognized by UNESCO. Mr. John Tee-Van, Executive Secretary of the Zoological Park, is a member of the Zoological Garden sub-committee of the Council.

Mr. Crandall Elected

General Curator Lee S. Crandall, the Zoological Park's delegate to the annual convention of the American Association of Zoological Parks and Aquariums in San Francisco in late September, was elected chairman of the organization for the coming year. The 1948 convention will be held in Boston.

"Louie" Is No More

The death of a Triangular-spotted Pigeon in October would not, ordinarily, be considered a newsworthy event. But this pigeon was different; it figured in the police courts some years ago.

The bird (an African species) was hatched in the Zoological Park's collection in 1934. Early in its career its parents showed signs of neglecting it and Keeper Joe Gerben of the Bird Department reared it by hand. For several years it was a familiar pet and was allowed comparative liberty in the keepers' room in the Pheasant Aviary.

Then, in the fall of 1939, the inevitable happened — someone left a window open, and "Louie" flew out.

Nothing more was heard of him until the next spring when the secretary of a Bronx racing pigeon club telephoned General Curator Crandall to inquire if such-and-such a band number belonged to birds banded at the Zoological Park.

"There's a funny-looking pigeon with your band over at the police station," he reported.

Keeper Gerben had attached an old racing pigeon band to the leg of Louie while he was still a young bird. He went to the police station — and sure enough, there was Louie, fluttering around in a cage of racing pigeons.

It turned out that the police had raided the pigeon loft of a man suspected of using his hom-

ing birds in smuggling operations, and that they had called in the Bronx pigeon club's secretary to report if the birds actually were capable of carrying small objects. The official knew that Louie, at least, was not a homing pigeon, and traced him to the Zoological Park through the old band on his leg.

Louie came back to the Zoo in the spring of 1941 and led a blameless, escapeless life until this fall when he died of the complications of fairly advanced age.

It Worked

More than a year ago we informed the members of the Zoological Society, through "Speaking of Animals," of a scheme whereby we hoped to acquire a pair of the rare and beautiful Satyr Tragopans. Now there is something to report.

At that time we had two Satyrs, but both were females. There were a few other Satyr Tragopans in the United States but all were happily mated — except one, a male, owned by Mr. J. W. Steinbeck of Concord, California.

We tried to acquire it as a mate for our birds, but it was a pet of Mr. Steinbeck's son and he could not bear to part with it. So we did the next best thing and shipped one of our females to California by air express.

The arrangement has paid dividends. Our female proved to be a good egg-producer and several of the eggs hatched. Last year Mr. Steinbeck sent us a young male, this fall he followed it up with a young female. So now we have a fine pair, and perhaps we will be rearing some young Satyr Tragopans of our own before long.

ZOO HOUSEKEEPING

Notes on a Variety of Operations

Duck-banding on the Wildfowl Pond will start as soon as we get a hard freeze and ducks start coming in. The work will be carried out in co-operation with the New York State Department of Conservation and is part of a long-term effort to determine exactly where ducks go on their migrations along the coast, so a system of refuges can be laid out more intelligently.

"Winter," to the Zoological Park, begins when the weather turns sufficiently cool enough for heat-loving animals to be brought inside. Ordinarily October 10 is the pivotal date but this year the warm weather held on extraordinarily long and very few exhibits had to be removed indoors until around November 1. The Gibbon family was brought inside on October 29. Young "Junior," born on Gibbon Island on September 10, 1945, is now two-thirds grown and is an active, healthy animal, although not as engaging as when "he" was a baby. (Junior is now suspected of being a female.)

* * *

Next spring the animal riding track should be one of the busiest spots in the Zoological Park — we have received three young riding dromedaries that will be broken in during the winter to carry children, in their slow, sedate way, around the track.

* * *

A Costa Rican Quetzal and a Ruby-throated Hummingbird "flew" to England this fall, as part of an exchange arrangement between the New York Zoological Park and the London Zoo. They were carefully boxed, placed aboard a plane at noon, and were delivered to a keeper from the London Zoo at the London airport the next morning. A cabled report came to us that they were in perfect condition. Later London Zoo will send animals to us.

* * *

After a very successful season, the Children's Zoo closed for the winter on November 16. It will reopen next spring, on April 10. Question House has also closed, on November 11. During the winter inquiries about animals will, as usual, be answered by the various Curators or by the Education Department in the Administration Building.

* * *

Big tropical cockroaches about three inches long—familiar sights to anyone who has traveled in the New World tropics—are being exhibited in a special (and escape-proof) compartment in the lobby of the Reptile House. The colony now numbers about 200 specimens, all descended from three pairs presented to us by Dr. William Mann of the National Zoological Park two years ago.

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ANIMAL KINGDOM

NEW YORK ZOOLOGICAL SOCIETY



—♦—
VOLUME LI

JANUARY TO DECEMBER, 1948

NUMBERS 1-6
—♦—

INSTRUCTIONS TO BINDER

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ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

Bulletin of the
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New Latitudes for the Society

THERE ARE FEW THINGS more to be desired by any educational or scientific institution than established *outposts* where additional facts in the sphere of its particular interests are obtainable. The simile of *advance patrols* sent out by an army advancing into unknown territory may not be too happy a one in these parlous times, but no better one comes to mind. In the general field of biology, and the more specific field of zoology, the frontiers of knowledge still lie over the horizon. No doubt they always will.

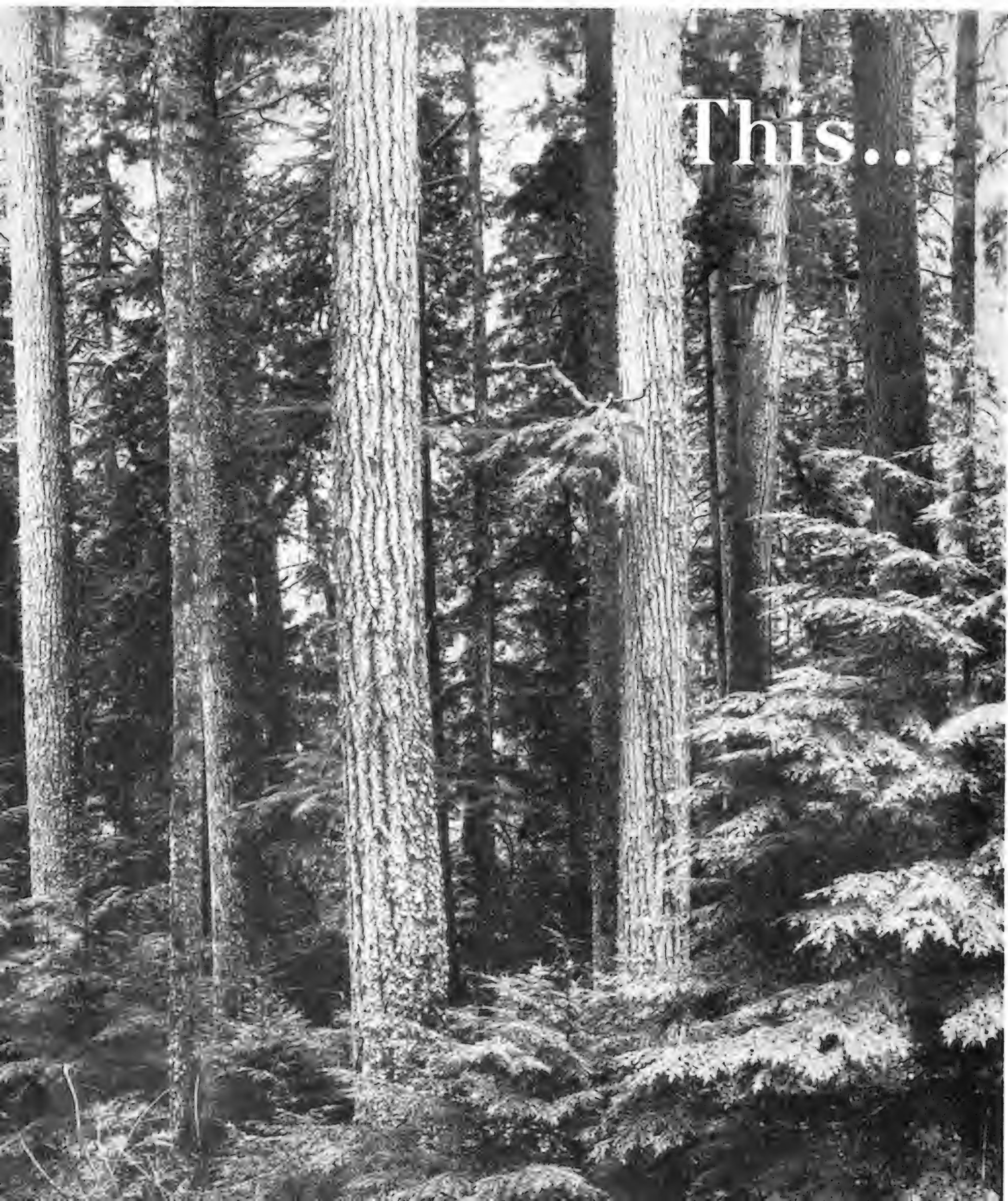
For several decades under the brilliant leadership of William Beebe, Director of the Tropical Research Department, the Society has had a mobile and highly sensitive *advance patrol* in the tropical zones of South America. The greater part of our institution's accomplishments in field research up to this time has been due to the inspirational work of this keen observer and his staff (he calls himself a *student*, frequently saying, "I am just beginning to learn.")

It is good to be able to report that within the past year our Society has established a new outpost for scientific work in Jackson Hole, Wyoming—temperate zone, *latitude* 44° N. This was the center of great activity in field research during the past summer and no doubt will continue so throughout the years that lie ahead.

Further, we are now in the process of attempting to establish still another *outpost*. In March, Dr. Alfred Emerson, eminent zoologist, a Fellow and member of the Scientific Advisory Council of the Society, is going to the Belgian Congo, there to pursue work in which he himself is particularly interested, involving studies of termite societies and certain evolutionary problems, but, in addition, to explore on our behalf the possibilities of the establishment of a research center at or near the Equator, *latitude zero*, where American scientists in collaboration with those of Belgium and other European countries, can work on zoological problems peculiar to the equatorial regions. In short, we are reaching out towards new horizons of knowledge and into new latitudes wherein such knowledge may be found.

Fairfield Osborn

*Do We Want to Save
Olympic National
Primeval Park?*



This...

OR



By **SAMUEL H. ORDWAY, JR.**

IN THE extreme northwest corner of the State of Washington the Olympic Peninsula embraces a wilderness area, half devastated by wasteful lumbering on private lands, and half preserved in the rare beauty of Olympic National Primeval Park — home of the last native herd of Roosevelt elk. Legislation is now pending to open 56,000 acres of this National Park to lumbering.

Here is the famous Olympic “rain forest.” Stratus clouds, forming over the warm Japan current in the Pacific, drift in against snow-capped mountain peaks in the Park and precipitate an average rainfall of 142 inches a year to nurture this “forest of fantastic appearance and huge proportions”¹ in the valleys of the western slopes. Here Douglas fir, Sitka spruce and giant

red cedar, moss-covered and jungle-bedded, grow to prodigious heights. Some of these trees are more than five hundred years old.

John Muir called this a forest kingdom unlike any other. Among its inhabitants are bear, deer, cougar, elk, eagle, raven, bandtailed pigeon, pileated woodpecker, owls great and small, Hepburn’s rosy finch and the water-ouzel.² So wild is this Olympic area that there is no record of exploration through the interior until the 1890s. Soon after, the lumbermen moved in.

A Forest Reserve was first established by President Cleveland in 1897. Lumber interests fought this reservation of timber, and Congressional legislation soon reduced the reserved area by 20%. The elk herd was also decreasing. In 1909 President Theodore Roosevelt created the Mount Olympus National Monument for more permanent protection of the forest and the elk.

Congress, heeding renewed demands for lumber and minerals, had cut the Monument area in half by 1937. In that year President Franklin D. Roosevelt was persuaded to visit the Peninsula and observe for himself the unique nature of the wilderness which remained, and the wasteful cutting on unreserved lands.³ The President returned from his visit in favor of legislation to create a Park, which was established in 1938.

Today the mill owners freely confess that timber growth on privately owned lands is no longer able to support capacity production of existing mills on the Peninsula. Privately owned lumber is running out.

Fearing more drastic legislation, in 1947 the National Park Service proposed to transfer to the U. S. Forest Service 56,000 acres within the western boundary of the Park "to attain a better boundary from the standpoint of administration and protection." This acreage contains 2½ billion board feet of the finest rain forest stumpage. H.R. 2750 and 2751 are bills now pending to effectuate this transfer.⁴

By law, a National Park is set aside to be held inviolate for the enjoyment and inspiration of this and future generations. A National Forest is set aside to be managed under the best possible forestry practices for the maintenance of productive timber growth and recreation. Established Forest Service policy of "sustained yield cutting" will make released stumpage gradually available for use by local industry.

Conservation organizations are up in arms against the alleged "grab." Their contentions spread all the way from the sentimental "spare not a single tree?" through political and economic diatribes, to claims that the elk will be exterminated.

Proponents of the transfer contend that:

- (a) The public does not today begin to use for study or recreation the great area of rain forest contained in these 56,000 acres.
- (b) There is ample additional rain forest, which will remain in the Park, to serve scientists and lovers of wilderness for all time.
- (c) Many of the great trees now in the 56,000 acres have completed their period of maximum growth, are already rotting and falling, and the timber in them will be wasted unless cut before many years go by.

- (d) These great trees will not last long anyway. They are gradually being replaced by the "climax crop" of hemlock and silver fir.
- (e) "Sustained yield management" of this 56,000 acres in hemlock and silver fir will produce enough wood to maintain the present pulp industry on the Peninsula for years to come.
- (f) Far from depriving the elk of their winter range, cutting, followed by new growth, will provide better forage for the elk than they now find in the primeval forest.

FROM THE viewpoint of the Society's Conservation Division, the ultimate issue is whether this particular area of 56,000 acres of wilderness will serve a higher usefulness if preserved in a National Park for protection of wildlife and for study, enjoyment and inspiration of the people, or whether it will serve a higher usefulness if transferred to the Forest Service to be managed as productive forest crop land. The writer had occasion to visit the peninsula in August and to report his observations.

1. Here is an area of ruggedness and grandeur — of brilliant sunsets above the drifting blue sea waters of the Strait and the pounding surf of the Pacific; of tall peaks, snow-capped the year round; of high alpine valleys, wildflowers, and, in the western lowlands, thick jungle-growth reaching far inland.
2. There are now 856,000 acres in the Park, of which approximately 300,000, largely in the valleys of the great rivers flowing westward to the sea, are "primeval rain forests." The fact is that the 56,000 acres in controversy contain only a small portion of the "rain forest" in the Park.
3. There is at present comparatively little public use of most of this rain forest for study and recreation. Campers and hikers in most cases keep close to the roads and trails. They like to observe the nature and beauty of the jungle and great trees, but comparatively few penetrate far from beaten paths. They are interested in fishing the streams and in climbing to the high peaks.
4. The present stand of timber on the 56,000 acres, if clean cut in small sections annually under present Forest Service practice, would keep only *one* of the plywood and saw-timber mills on the Peninsula supplied with its annual needs — until the big trees are all felled.



U. S. Forest Service Photo

The last native herd of Roosevelt Elk makes its home in the Olympic National Primeval Park. Transfer of the area to the Forest Service, with the resultant cutting of timber, will expose the Elk to more intensive shooting. These are two Roosevelt Elk calves in the National Forest.

5. Any form of cutting will soon mean the end of the big Douglas firs, Sitka spruce and red cedar in this acreage. Hemlock and silver fir are climax crops and will naturally succeed the Douglas on the deep humus of this forest floor.

6. If the land is to be used for "cropping," the most productive practice would be management of the acreage for rapid growth and cut of hemlock and silver fir for pulpwood. Sustained yield production of pulpwood — hemlock and silver fir — from the 56,000 acres, in addition to yield from private lands, would substantially support present pulp production on the Peninsula in perpetuity.

7. Cutting practices are presently wasteful. It is not considered economical to transport to the mills from remote areas 15" trees and poles. They

are left lying on denuded lands to rot or burn. There is no shortage of pulpwood on the Peninsula — merely a shortage of economically available pulpwood near the mills.

8. The elk do come down onto the 56,000 acres to graze — and they do, even today, proceed further on down for winter forage onto farms and private forest lands already denuded and growing up to brush. They forage *best* on cut-over lands newly grown with thick brush of certain kinds.

9. No accurate census of elk is taken periodically. Majority opinion indicates that the elk are decreasing in numbers gradually, due largely to hunting which is encouraged by the public and farmers.

10. There are no insoluble administrative difficulties involved in present irregular Park bound-



The Black Bear is a fitting, sombre denizen of the fantastic forests of the Olympic National Park. This picture reproduces one of the great paintings by Carl Rungius in Society's collection.

aries. The Park and Forest Service patrols, and joint fire-prevention services, are coordinated and such administrative problems as exist will continue to exist for one service or the other, or both, regardless of transfer of control.

What, then, is the wisest use of this 56,000 acres of forest land now and for posterity? The writer believes that basic principles of wise resource use establish conclusively that the value to be derived from timber cropping on this acreage will be far less than the value derived from its preservation as wilderness area.

Presently standing timber would add but a pittance to the supply of forest products which the nation now consumes annually and will need in the years to come. Under limited cutting, such as is permitted by Forest Service practice, the present stand would become available at a rate of not more than 25 million feet a year. That would supply one twenty-eighth of one percent of the Nation's annual saw-timber requirement after 1950.⁵

This same area, intensively managed and fully

stocked, would under most favorable conditions eventually yield not more than 50 million board feet annually in the climax crop of hemlock and silver fir.⁶ That is only one fourteenth of one percent of the nation's annual requirements after 1950 — a small chip in a mighty woodpile! It is only a pittance, also, of the pulpwood we now consume.

And a pittance that is not needed! The Forest Service states that our indicated annual foreseeable requirements for forest products *can* be met by intensive application of "reasonably good management" on existing farm and forest lands *excluding lands reserved from cutting in National Parks and Monuments*.⁵ Sacrifice of Park trees to relieve distressed mills today will delay, rather than speed, inauguration of the required program of "reasonably good" forest management. Only public awakening and aggressive action throughout the Nation can achieve in time sustained forest production equal to our demand.

What, by way of contrast, is the value of this area as Park preserve? The 56,000 acres con-

stitutes a very substantial and rich portion — almost a fifth — of the one fantastic wilderness of its kind left to our generation. Future requirements for wilderness, if such wilderness is not now preserved, can not be met by “good management” hereafter — nor by heroic efforts of any kind. Primeval wilderness is as intangible in its origins as life itself.

Although these ancient Douglas fir and cedar giants live beyond maturity and fall, they are not wasted. The cycle of their life and death is part of an age-old cycle which makes this wilderness unique. If we harvest these trees, the lush growth, the ground cover and the wildlife of the forest will not subsist as they do now. The rotting hulks of these giants turn to humus, and with the minerals of the earth, the rain and the moss, become a unity — itself the essence, the life-supporting element of this primeval wild.

Though the area is little used today, Olympic is a young Park. More and more people are using it each year. Roads and transportation are being improved. Visitors will become more used to the terrain and will penetrate further and further into the forest. As the national population increases there will be more people who need wilderness.

Americans will need the wilderness, as time goes on, and the Olympic Park provides rugged, towering heights. This is north slope.

Without enough wilderness America will change. Democracy, with its myriad personalities and increasing sophistication, must be “fibred and vitalized by regular contact with outdoor growths — animals, trees, sun warmth and free skies — or it will dwindle and pale.”

That was said sixty-five years ago by Walt Whitman, before the Olympic Peninsula had been explored, before Americans had need to go far West for lumber or for land, for sun warmth or free skies. How small then was the comparative demand upon our life-supporting resources! Today we have so many more people — so much less wilderness!

Management of the elk herd is a problem based on the total relationship of food, range, environment and number of elk on the Peninsula, and of hunting regulation and control rather

than of the use made of this particular 56,000 acres. Nevertheless, all hands agree that to transfer these acres to the Forest Service and permit cutting of timber on them will expose the elk to more intensive shooting in and out of season. Game-law enforcement is already a problem on the Peninsula.

¹ “Olympic National Primeval Park,” National Parks Magazine #86, July-Sept., 1946, page 25.

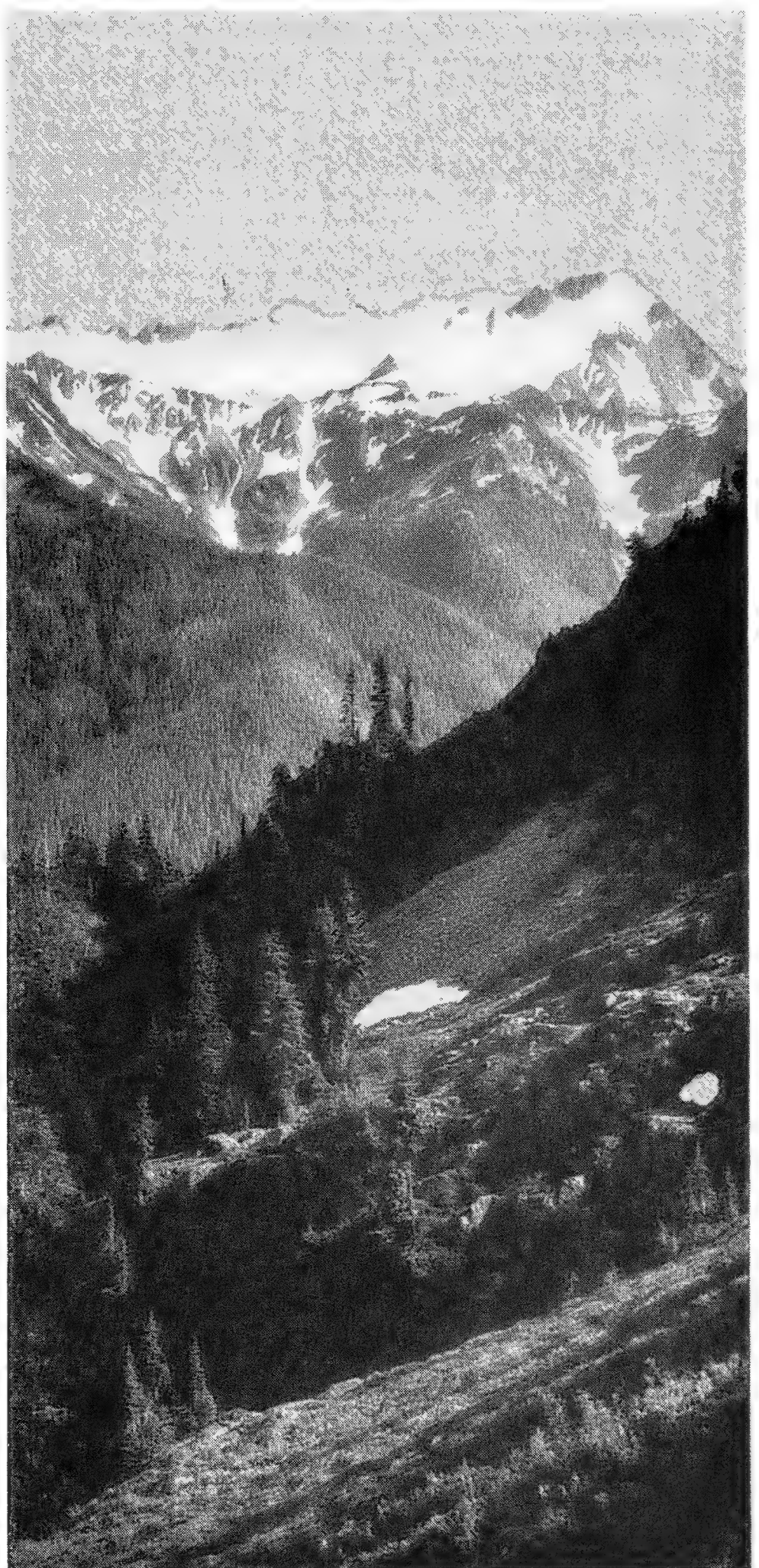
² Irving Clark, “Our Olympic Heritage,” The Living Wilderness, June, 1947, page 6.

³ “Trouble on Olympus,” Sierra Club Bulletin, June, 1947.

⁴ “The Raid on the Nation’s Olympic Forests,” Publication #93, Emergency Conservation Committee, New York, 1947.

⁵ “Potential Requirements for Timber Products in the United States,” Report #2 from “A Reappraisal of the Forest Situation,” U. S. Department of Agriculture — Forest Service, 1946, pages 9-12.

⁶ Technical Bulletin #544, “Yield of Even Aged Stands of Sitka Spruce and Western Hemlock,” by Walter H. Meyer, U. S. Department of Agriculture, March, 1937.



Catch 'Em Little, Grow 'Em Big!

By JAMES W. ATZ

THE LARGEST ANIMALS in the world have always been water-dwellers. For eons—while great shell-fish, sea-scorpions and armored fishes dominated the ancient seas—terrestrial life was non-existent or relatively insignificant, but even when the land at last was populated with a host of crawling and running and flying creatures, the waters remained the home of Earth's real titans. That has been true from the prehistoric times of the hugest dinosaurs and giant sharks right down to today when sea-dwellers are supreme in size—fifty-foot squids, ninety-foot proboscis worms, hundred-foot whales.

There are moments when an aquarium man wishes there were no monsters of the deep. Their very existence is a challenge to his skill in keeping living things in captivity, and he has a feeling of frustration when visitors ingenuously ask: "But where do you keep the whales?"

Many years ago the old New York Aquarium for a time exhibited two White Whales in its large center pool. They were only 10 feet long, but they were whales, and they have remained in the public's memory. No doubt they are the foundation of the rumor that crops up every now and then that we used to keep a mighty whale in the Aquarium's cellar under Battery Park. This legendary, subterranean leviathan has plagued us almost as much as the "mermaid" that some people swear they once saw in the Aquarium. What the basis of *that* story is, we have no idea.

Although truly large whales and a good many other aquatic giants must ever remain as unattainable as the mermaid—for only in his dreams can an aquarist imagine them on public exhibition—there *are* several very large fishes that have been exhibited in aquariums (as well as some never

Giant fishes are always interesting to Aquarium visitors, so we are planning for the largest indoor fish-tank in the world.

yet exhibited) that we hope will some day be living in the tanks of the new New York Aquarium.

We are, in fact, planning for them. The NEW New York Aquarium is being designed with special tanks for Sharks, Tarpon and Giant Groupers, for Electric Eels nine feet long, for the massive Pirarucu of the Amazon and the hulking Mud Cat and Alligator Gar of the Mississippi. We are planning the largest indoor fish-tank in the world; it will be 53 feet long and 23 feet wide and it will hold more than 62,000 gallons of water.

We are planning, too, even larger outdoor pools for Sealions, Porpoises and some other aquatic mammals. We want to make it possible for our visitors to watch their antics from *below* the water level, as well as from the more conventional above-surface level.

But there is a trick in all this—the old, familiar problem of the weight of water and the surprising fragility of big fish.

It is a natural fact that big fish require a vast living space. A Giant Grouper of 300 pounds is an impressively big fish, but it takes an even more impressive volume of water in its aquarium circulation: 8,000 gallons, weighing 33 tons.

It has to have this enormous amount of water around it, or flowing through its tank, all the time, too. Bringing a big Grouper from the open ocean to the Aquarium means transporting a small private ocean as well as the fish, and that means pipes, pumps, filters and a great reservoir. It is



This Giant Grouper (Promicrops itaiara) was the biggest fish in the old New York Aquarium. It was captured in the mid-Twenties at Key West, Florida, by hook and line, and at that time weighed somewhat over 200 pounds. Until the closing of the Aquarium in 1941 it occupied a large tank on the main floor and increased in weight to about 350 pounds. Massive as this specimen was, it was a dwarf in comparison with the largest Groupers taken commercially — they are recorded up to 750 pounds. Giant Groupers are tough, hardy fishes, among the very few large species that can survive handling and transportation from sea to aquariums.



Photo by Dwight Franklin, Courtesy AMNH

The second largest fresh-water fish in North America is the Alligator Gar (the largest is a sturgeon). This Gar was taken in Moon Lake, Mississippi, in 1910; equally large specimens are rare today. The record size for an Alligator Gar is 9 feet 8½ inches, with a weight of 302 lbs.

possible to build such a thing, but what truck or for that matter what ship can carry all that apparatus?

One scheme has been worked out, to carry big fish aboard ship in quarters so arranged that water can be pumped direct from the ocean, circulated through the tank, and spilled out to sea again.

That eliminates the need for filters and a bulky reservoir, but the shipping arrangements are cumbersome and costly. So is air transport, although it has the advantage that fishes can be kept in a comparatively small volume of water because they are confined for only a short time.

There are other serious limitations to the trans-



One of the Tarpon that grew up in the Aquarium. Probably it would never have reached maximum size, which approaches 8 feet (according to Francesca LaMonte, world's authority on big game fishes), but was well on its way toward record size when the old Aquarium closed.

port of large fishes that involve their capture as well. Every fisherman knows how hard many fishes struggle when hooked or restrained in any way, and big game fishermen rarely bring their catch to the gaff until the fish is completely exhausted. It is practically impossible to capture a large fish without fatally injuring it. Once captured, the problem of lifting it from line or trap onto ship or truck must be faced, and removing such a fish from water for just a minute or two is usually fatal. Dr. C. M. Breder, Jr., for twenty-three years on the staff of the New York Aquarium, explains that, "Because these animals are normally supported in water, the visceral muscles and supporting structures are not capable of retaining the great mass of organs against their weight in air. . . . As a consequence there follows extensive derangements of the digestive and other apparatus, generally accompanied by rupture and hemorrhage which shortly spell the end. The writer has seen rays of less than two hundred pounds killed in this manner. Smaller animals of the same species may be handled with impunity, largely because the weight increases as a function of the cube of such a linear measurement as the length; that is, the weight increases at a much more rapid pace than the length, in accordance with a physical law."¹ At St. Augustine, Florida, Marineland has devised a method of restraining large fishes with hypodermically administered drugs and of transferring them without removal from water, but this is feasible only for short trips and with a limited number of species.

FINANCIAL requirements, geographical distances and the sensitivity of large fishes all conspire to prevent public aquariums from exhibiting all but a tiny proportion of the giant species found in both fresh and salt waters. However, there is another way to circumvent these limitations, one that is ideal, save that it may take years to accomplish. This is to grow big exhibits *in situ*, so to speak; to catch fishes and transport them to the aquarium while they are young and small, and there to rear them to suitable size. Giant fishes, too sensitive to withstand capture and travel, and those whose habitat is too far away, making the cost of shipping prohibitive, can *only* be acquired in this way.

The majority of the sizable specimens at the

old New York Aquarium were grown on the premises. Most noteworthy, perhaps, were the Tarpon. Ever since the building was opened in 1896, attempts had been made to show this popular and beautiful game fish, but the large specimens always succumbed to injuries sustained during their capture or transport. It came to be thought that Tarpon were nearly as sensitive as their notoriously delicate relatives, the herrings. Finally in 1936 a number of young Tarpon were taken in southern Florida. Since these were much smaller than any ever before available for exhibition, the Aquarium acquired fifteen for its collection, and when they arrived, they turned out to be less than one foot long. Three died shortly after their trip north, but the rest settled down and grew rapidly.² Five years later, when the Aquarium was closed down, some had attained a length of four feet.³ Contrary to expectations, they were excellent tank fish, not being at all sensitive, except to handling. We now think that it will also be possible to exhibit the East Indian Tarpon (*Megalops*), especially since the Siamese habitually take small specimens found along their coast and rear them in inland, fresh water ponds.⁴

Megalops has never been seen alive in the United States, and it is but one of many larger fishes that would undoubtedly thrive in captivity if small enough individuals could be captured and transported. Although the aquarist may deplore his inability to keep captive Swordfish, Ocean Sunfish, King-of-the-Herrings or Man-eater Sharks, he cannot commiserate with himself for long, because there are so many other spectacular, giant fishes, that no American aquarium has yet displayed, but which are definitely possible exhibits, ones that the new New York Aquarium is going to make every effort to show its visitors some day.

Among these are the various kinds of giant catfishes, found in the rivers of Europe, Asia and South America, two species hailing from southeastern Asia, one or two from South America and one from Europe. All of them reach or exceed lengths of ten feet, some having been estimated to weigh well over 600 pounds.

The largest fresh water fish in the world, however, is the celebrated Beluga Sturgeon of the Volga river and Caspian sea that attains weights of more than 3,000 pounds—truly the colossus of

fresh water fishes, as Dr. E. W. Gudger, authority on giant fishes, calls it.⁵ What a splendid show even a relatively small one would make! So far as we know, the Beluga has never been exhibited in this country, although billions of its eggs have been imported and consumed as caviar. One fourteen-foot specimen weighed 2,200 pounds and contained almost 400 pounds of caviar, enough to provide an army with canapés or cocktail sandwiches. Incidentally, the largest North American fresh water fish is also a sturgeon which is found in the rivers of our northwest. It does not approach the Beluga in size, however, the largest one on record being 12½ feet long and weighing 1,285 pounds.⁶

Somewhat less astounding than the great stur-

geons, but well worth striving to exhibit, will be *Catlocarpio* of Thailand ("granddaddy" of all the carps and minnows), *Lates* of Africa (greatest of fresh water perch) and *Thyrsoidea* of the Indian and southwestern Pacific oceans (probably the largest of living eels). So little is known about the above species that their public exhibition will undoubtedly enlighten ichthyologists more than non-scientific visitors, who, nevertheless, will be able to marvel at these wonders of aquatic life growing up in the new New York Aquarium.

¹ Breder, *Bull. N. Y. Z. S.*, 39 (4): 149-153, 1936.

² Breder, *Bull. N. Y. Z. S.*, 40 (1): 21-22, 1937.

³ Breder, *Zoologica*, 29 (19): 217-252, 1944.

⁴ Smith, *Bull. U. S. Nat'l. Mus.*, 188, xi + 622, 1945.

⁵ Gudger, *The Field*, August 4, 1945.

Jour. Bombay Nat. Hist. Soc., 45 (3): 374-390, 1945.

Sci. Monthly, 57 (6): 500-513, 1943.

⁶ Gudger, *Natural History*, 49 (2): 115-121, 1942.

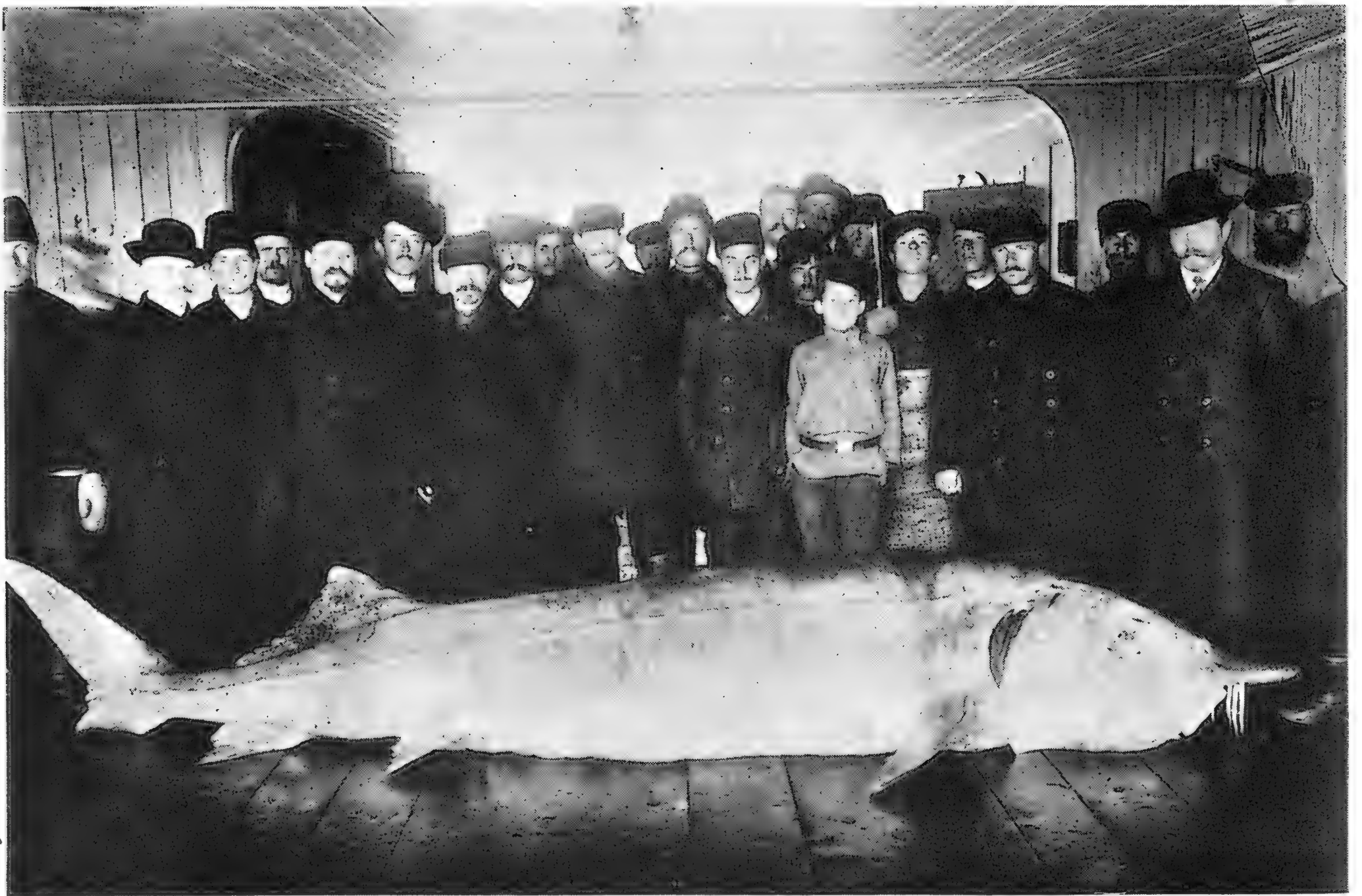


Photo Courtesy Dr. E. W. Gudger

The largest fresh-water fish in the world is the Giant Beluga Sturgeon (*Huso huso*) of the Caspian Sea, the Volga River and other large rivers flowing into the Black Sea. This particular specimen was captured in 1912 at the mouth of the Volga near Astrakan, after it became entangled in a drifting net. The fish was 14 feet 2 inches long and weighed 2,250 pounds.



“ . . . SLIGHTED BY EVERY LIVING CREATURE FOR HIS UGLINESS.”

The Ugly Duckling

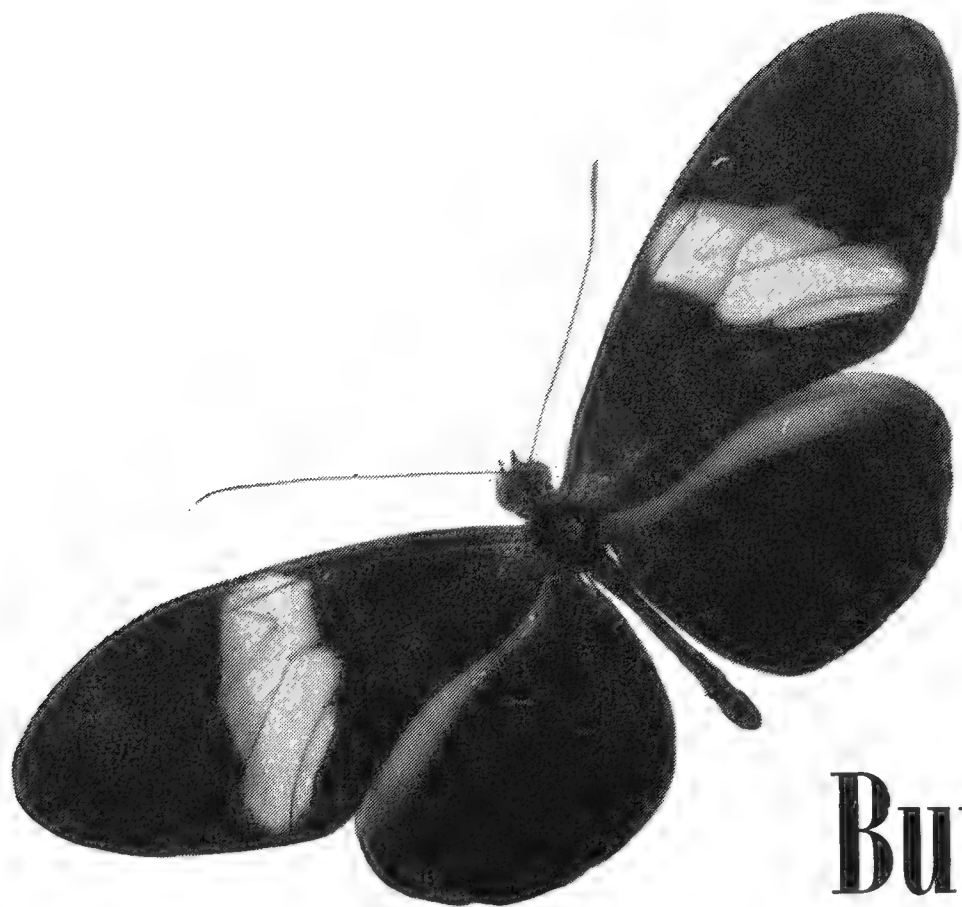
“HOW UGLY YOU ARE!” exclaimed everyone in the Duckyard, and the poor duckling was chivvied and harried by all; even his brothers and sisters were always saying, “If only the cat would get you, you hideous object!”

Around the Zoo we have been re-reading Hans Christian Andersen’s delightful story of the Ugly Duckling that was really a Swan (not overlooking the moral, that it does not matter having been born in a Duckyard, if only you came out of a Swan’s egg), and the reason for this sudden reversion to childhood is this —

In mid-November we were asked by telephone to take charge of a “large, dirty, ugly bird” that

had come down in a Bronx back-yard. It turned out to be a black-footed domestic Mute Swan of western Europe — a brown young bird of the year. We gave it a home on one of our ponds, despite complaints that a soiled Swan should not be exhibited.

For we can foretell events. This sooty brown plumage is not permanent. This is the Ugly Duckling of the Andersen story. The Polish variety of the Mute Swan is, indeed, hatched white and remains white. But cygnets of the black-footed form that Andersen wrote about are not white until after their first moult. Next autumn our Swan will no longer be an Ugly Duckling!



What's in a Butterfly's Name?

By WILLIAM BEEBE

ON June sixth while sitting at the top of Portochuelo Pass near Rancho Grande I made many notes on a common but very lovely butterfly whose name is *Heliconius melpomene*. Its oblong wings are black with two large bands of scarlet and as it flew slowly it was very conspicuous. Its protection lay in the scent given off when the insect was disturbed. The air above the gorge might be heavy with the odor of tropical blossoms but if one of these butterflies was netted and held in the fingers, the whole atmosphere was filled with a strong odor of witch hazel. This is a clean, pleasant fragrance to me, but apparently not to butterfly-loving birds and lizards.

A note was made to see why so lovely a butterfly had been given the name of the Muse of Tragedy, and six months later, in my library in New York I opened the yellow-edged pages of my precious copy of Carl Linnaeus' *Systema Naturae* for 1758; the Bible, the Doomsday Book for all taxonomists.

I found that on page 458, where the author began playing nomenclatural Adam to butterflies, he discarded all descriptive names suggestive of color, pattern, texture, form or locality, and systematically preempted what would correspond to a telephone directory of all the gods, goddesses and socialites of Greek mythology. On the first two pages of his list we find butterflies baptized with the names Priamus, Hector, Paris, Helenus, Troilus and Deiphobus. We know the

species of insects thus designated, and although assigned by the illustrious Swedish naturalist one hundred and ninety years ago, these names are still in general use. Any attempt at reconciling sex, character, achievements, personal attributes, nobility or moral turpitude of these Grecians with the delicate, colorful butterflies bearing their names is quite futile.

Considering the names as names for a while, light emerges, the mystery is solved, for there is no mystery. We realize that Linnaeus' mind systematically dissected a Grecian Burke's Peerage, for in these names (including Polytes, No. 7, on the following page) we have King Priam of Troy and his six sons. Perhaps some sense of delicacy on the part of the author made him reserve for still another page, Numbers 18 and 19, Helen and Menelaus.

With this suggestive discovery as a lead we turn to Page 466 and 467 and find in order the names of all nine Muses, from Terpsicore to the ninth and last, Melpomene. This is not all. Linnaeus recognized 192 species of butterflies as known to him in 1758, and he naively grouped them all under the term or genus *Papilio*, which would have identified these insects to any Grecian school-boy. But from here on mythology holds sway and we find Priam and his sons heading the group, band or Phalanx (or sub-genus) of

Equites Trojani or Knights of Troy. Melpomene, in turn, is one of fifteen species including Apollo and the sacred Nine which are appropriately assembled under Heliconii. Helicon was, as we know, the mount or meeting place of Apollo and the Muses. Thus we enjoy discovering that Linnaeus is as neat, exact and logical in his mythological as in his biological classifications.

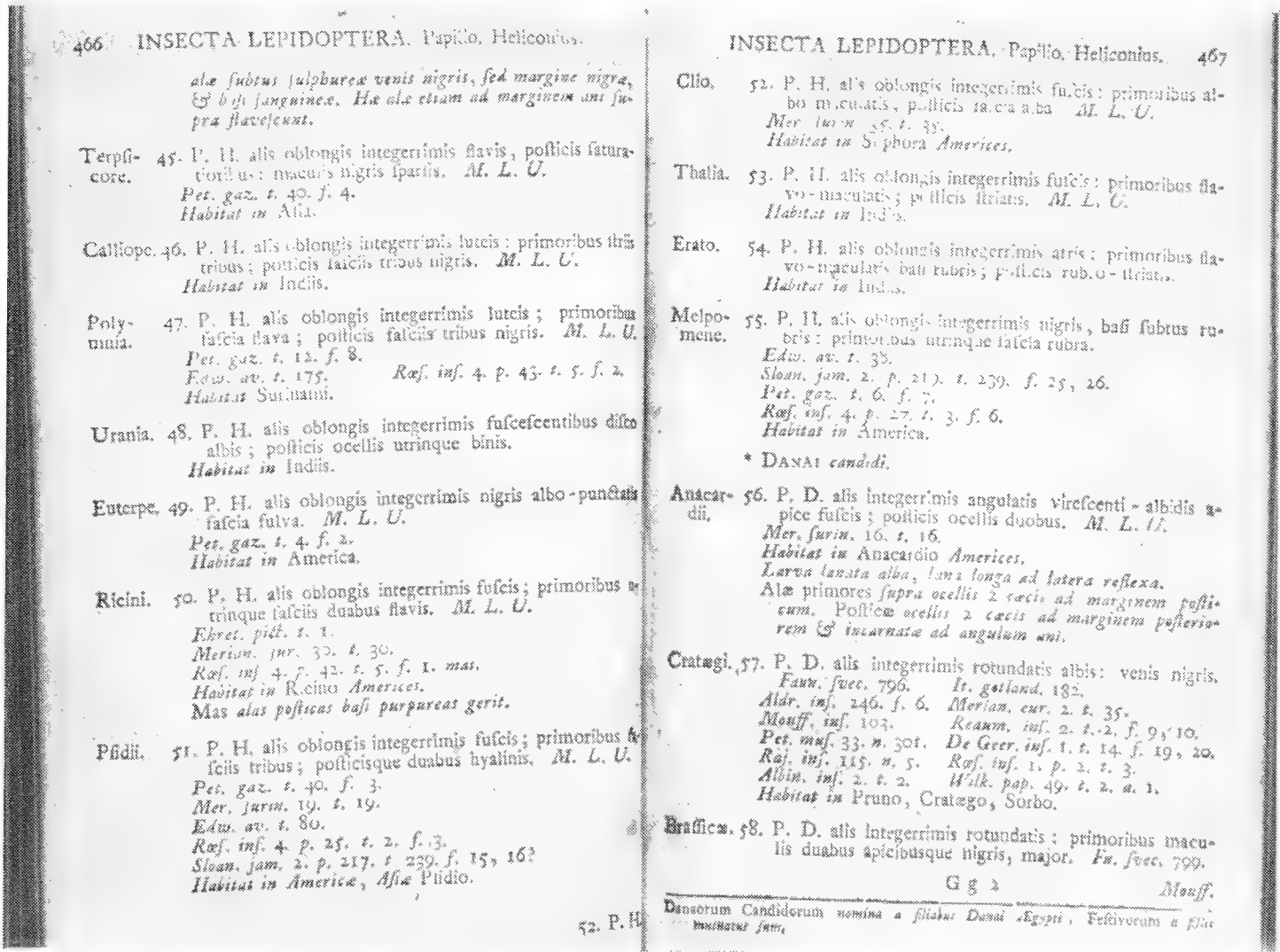
Linnaeus in a single sentence of eleven Latin words precisely and accurately describes *melpomene*: "Oblong wings wholly black, basally red below; fore wings with a red band on both sides." I hoped for some pertinent and amusing comment such as the author attaches to the domestic cat, "When roused is most agile; makes love wretchedly, with yowling and squabbling." But concerning *melpomene* there is only "*Habitat in America.*"

Linnaeus refers to four authors who knew the butterfly we are talking about. The second of these reads like a series of short-hand references "Sloan.jam.2.p.219.t.239.f.25,26." This refers to Hans Sloane who founded the British Museum and who wrote two volumes on the Natural History of Jamaica. These are great elephant folios, fascinatingly replete with copper plates, which appeared in London in 1725. Fortunately I possess a copy and find an unmistakable *melpomene* described and pictured. But this was in pre-Linnaean days when binomials were still un-

known. Sloane's name is "The-Black-Darien-Butterfly-with Two-Spots" or more exactly "*Papilio-Cartigenius-nigrescens-alba-linea-prope-extremitatibus-alarum.*" This is exactly as if I were to receive a letter addressed to The-Tall-Lanky-Baldheaded-New-York-Naturalist-Who-Likes-To-Study-Jungle-Creatures, instead of to William Beebe. Thank God for Linnaeus and brevity!

From Sloane's Latin description we learn that the wings of this particular butterfly are brown and the bands are white, so we can be certain that the specimen was sadly faded by the sun for many years, perhaps for the two decades' delay in the appearance of the second volume. Of casual notes we are told only that "Tis common . . . and was sent from Cartagena."

A few delightful lines in the Introduction explain the delay and the consequent fading and present a charming commentary on the character of old Dr. Hans Sloane. He says that the first volume "begot a very earnest Solicitation from many People, for whom I have a very great Regard, to publish this Second, which hath been delay'd chiefly by a multiplicity of Business in the Practice of Physick, which I esteem one of my first Cares, and must be minded, if the Lives of Persons be regarded, with due Attention to the several Symptoms and Changes of their Diseases." I can think of no better excuse.



Systema Naturae, "Doomsday Book For All Taxonomists"



From the north side of the Wildlife Park one looks across the Snake River toward the snow-clad Tetons. Part of the range for Bison is visible in this most impressive view.

(Pennsylvania State College Photo)

The out-of-doors laboratory of the Park is already in operation, for during the summer students from five universities worked under Professor Enders of Swarthmore. ➡

(Pennsylvania State College Photo)





First Fruits of Jackson Hole Wildlife Park

In Jackson Hole, Wyoming, we, in cooperation with the State of Wyoming, are establishing a Wildlife Park that is sure to become a national center of public recreation, a potent influence for the protection of wildlife and related living resources, and a great "out-of-doors" laboratory for research. During the summer a series of long-term studies of the biology of the region were started under the direction of Prof. C. R. Carpenter of Pennsylvania State College and James R. Simon, resident Director of the Wildlife Park.





Elk herds foraging for themselves are familiar sights in Jackson Hole during the winter months. (Left) A Black Bear cub was an inquisitive visitor to the Park last summer.





Numerous beaver cuttings may be found in the Wildlife Park and it thus serves as an ideal laboratory for the study of Beaver habits and behavior. This is a typical cut.



Visitors to the Jackson Hole region always enjoy seeing the Pronghorn Antelopes, graceful creatures that are an essential part of the West. This is a fawn born in the Park.

One of the delights of the Wildlife Park will be scenes like this one—a glimpse through the trees of a Moose, undisturbed and completely wild, crossing the stream.

(Al Scholz Photo)





Belgian Congo Information Service Photo

In the quiet waters of the Dungu River that borders the Government's Elephant Domestication Station, the herd of trained elephants is allowed to bathe and drink. These are all "monitors."

Elephants in the Belgian Congo

By WILLIAM BRIDGES

BY THE time this article appears in *ANIMAL KINGDOM*, the author expects to be somewhere in the equatorial rain forest of the Belgian Congo, probably about 1,000 miles inland in the region of Stanleyville. Early in February he will find and join Charles Cordier, the Zoological Society's animal collector, and will start sending back Newsletters to the Society's Members and its friends about our Congo Expedition's search for some of the greatest animal treasures of Africa.

A year and a half ago the Zoological Society sent Mr. Bridges to the Belgian Congo to arrange for the shipment of three adolescent elephants presented to the Society by the Belgian Congo Government as a token of the war-time and abiding friendship between the United States and Belgium and her colony. After bidding the elephants *bon voyage* he spent several weeks travelling through the Congo, and this article is one of a series resulting from that trip.

THE FIRST two weeks in February are the best time to capture elephants in the Belgian Congo because the tall grass has been burned off and the new grass is short, and because the elephant herds have not been molested for ten or eleven months and can be taken by surprise. The capture-teams are probably already in the field at

Gangala-na-Bodio and if they have good luck they will have captured half a dozen six-foot elephants by the time this article appears. If their luck is really good, nobody will have been killed, either.

Gangala-na-Bodio ("The Hill of Bodio," named for a native who used to live there) is the Belgian Congo's Elephant Domestication Station and the

government maintains it for four reasons: prestige (it was a pet project of the late King Leopold and it is still the only elephant domestication station in Africa); research (some work is done on the diseases of elephants); to supply work elephants to Congo plantations (about 100 are working now, rented out by the station for 5,000 francs each a year); and to provide elephants for zoos (21 were given away or sold for 40,000 francs each — about \$1,000 — in 1946).

The mortality after capture is high; it was 56 per cent. in 1945, 60 per cent. in the first nine months of 1946. Better methods of pasturage and more careful precautions against parasites were being instituted when I visited Gangala-na-Bodio in the fall of 1946, and the rate of survival may be better now. Lieut. Col. Pierre Offermann, the Chief Game Warden of the Congo and the director of the Gangala-na-Bodio station for 16 years, thinks it can be levelled off at about 80 per cent. survival. Anyway, the station can and does handle a lot of elephants; 40 were captured in 1945, 30 in 1946 and 30 last year. Unfortunately elephants wear out and last spring's twenty-day rough-and-tumble capture campaign cost the lives of three experienced "monitor" elephants, among them old Jules, a huge one-tusker captured in 1909 and named for Commandant Jules Laplume who founded the Congo's first station at Vira-Vungo in 1900. Steady and well-trained monitors are absolutely necessary to a successful capture, and last year's losses probably mean a considerably reduced capture this year.

COL. OFFERMANN worked out the technique of capturing elephants at Gangala-na-Bodio. The method is far different from the "keddah" practice in India — and, I should think, a good deal more dangerous. Twelve men were killed at Gangala between 1927 and 1940.

The Congo station depends pretty much upon the sheer stamina of its hunters. The hunting party always consists of an European mounted on a swift Sudanese pony, a team of 16 to 18 men on foot, a party of 10 to 15 monitor elephants and their caretakers, and an echelon of carriers or wagons with camping equipment, food, ammunition, spare ropes and the like. Four of the actual hunters carry guns; the others are equipped with lassoes of soft rope. They are all

volunteers and all Azande tribesmen — tall, thin, long-legged, born hunters, intensely proud of their jobs. On the trail they don't talk much; they just watch the track and keep on going.

Gangala-na-Bodio hunts by special permission in the Garamba National Park which lies just north of it across the Dungen River, occasionally in the bush-grassland outside the Park. The Garamba is an immense area (4,700 square miles) that runs right up to the Sudan border. It is mostly low bush and tall grass — superb elephant country. Theoretically nobody is allowed to burn off the grass in the Congo, but actually most of Africa is ablaze during the dry season and the Garamba Park gets burned regularly starting when the rains slacken in December. By the end of January the terrain is mostly clear and the elephants gather in big herds sometimes numbering hundreds of animals, an amalgamation of the smaller family groups of a dozen to fifty that wander together during the rainy season.

The big herds find shelter and food during the daytime in patches of unburned bush — *kau* is the Zande name. At night they drift out into the *gara gbwa*, or burned places, because the grass is springing and is fresh and tender. By daybreak they are back in the *kau*.

Unsuspecting, feeding elephants leave a hurricane path of trampled bush and broken branches, tusk-scarred earth and droppings behind them, and are easy enough to follow. The rolling terrain and clumps of bush and grass make it easier still for the hunters to approach a herd, often within a few hundred feet. The approach is always from down-wind, of course.

From the shelter of a hill or trees the hunters size up the herd, sorting out with their eyes, in silence, the young bulls and the cows with young that are most likely to cause trouble. Some youngster ten or twelve years old, around six feet tall, may be close at hand; if so, a few whispered words settle the plan on him.

"The moment before attack is something you never forget," Col. Offermann told me. "It is like war, and the moment before a cavalry charge. You check every man with your eyes; they are all coils of spring-wire ready to leap forward. They don't say anything and you don't speak; you don't need to speak, for each of you has confidence in the other."



Belgian Congo Information Service Photo

Guardians of the elephants at the training station are Azande boys, intensely proud of their military discipline. This is a sergeant.

"Your eyes rest last on the native chief hunter. He nods, you flick your finger, and the riflemen fire in the air. At that instant the whole team leaps forward and breaks cover, yelling and screeching and running toward the herd."

The frightened herd stampedes with the hunters whooping behind. The youngster they have settled on in advance may lumber off at right angles, he may swerve into the heart of the herd

— he is unpredictable. If he stays reasonably clear, his fate is sealed. The swiftest and most skillful hunter draws along side him and makes fast — literally grabbing the elephant by the tail sometimes. With luck the hunter may quickly cast a loop of rope around a hind foot; all the hunters are incredibly dextrous at this dangerous manoeuvre of roping the foot of a fast-running animal.

The first contact is a signal for the whole team to pile on. More ropes are cast; some stick and some slip off. The yelling, leaping hunters are all around the elephant except within range of his tusks. They hang on to the ropes and slow his run, snubbing him against every bush or tree, whooping after him if the bush uproots and he breaks free. Another leg, and then another, are roped and the pulling begins in all directions. The sheer weight of men slows the animal; sooner or later a snub holds; momentarily the youngster is stopped in his mad course, and in a few seconds he is swathed in ropes like a kitten in a skein of yarn. He is the hunt's first capture, and an easy one.

They are not all so easy and uncomplicated. Young bulls and cows with young are always the hazardous members of a herd; the old bulls and old cows simply run away, but a cow may get the idea that she has to protect her calf, even though the hunters have no designs on it, and will tuck her trunk under her head and charge. Or a callow bull, liking trouble for its own sake, will abandon flight and give battle. Sometimes the hunters can frighten the attackers away by firing in the air; as a last resort, they shoot the charging elephant.

Actually snubbing a capture down, stopping it completely, is a cooperative business of course, but the hunter who casts the first rope around an elephant — and makes it stick — is officially credited with the capture and often the elephant is named for him. One Zande boy named Kalisue has 32 captures to his credit between 1932 and 1946.

As soon as an elephant is captured, a runner goes back to the base and brings up a monitor. Generally it towers over the capture and dominates him in size and strength. In any event, the monitor is trained and obedient, and it takes but a few moments for it to range alongside, for the

ropes to be cast off and recast to lash the two elephants together, the youngster tethered around the neck. Wild-caught elephants are not always completely calmed and comforted by the presence of the monitors, but if they turn fractious the monitors, without prompting from their cornacs (the riders), cool them off with a swipe of the trunk or tusks. Generally there is very little trouble once the monitors have been put in charge.

Elephants travel slowly — two and a half miles an hour is a fair walking speed by day, and it is even less than that when monitors are conducting captures to the base. The number of captures in any one hunting season, and to some extent the rapidity with which they are made, are determined by the numbers of reliable monitors on hand. Generally the Gangala station counts on two captures for every monitor, but some of the

best monitors may be used over and over again in a single hunt. One season Jules and Alberte (the latter captured in 1912 and one of the best of the monitors) were sent out at noon to bring in a captive. They returned at 10 o'clock the next morning, started out again at 11 A.M., and were back with their second at noon the following day. They had travelled about 50 miles in all, feeding as they went, with almost no rest. They did not seem particularly tired. Nevertheless, it is not good for an elephant to work it that hard, and the death of Jules last year was probably due in large part to over-exertion during the hunt.

Col. Offermann thinks an elephant that is being hunted could keep going for twenty-four hours at a speed of about four miles an hour, which is certainly more than a team of hunters could do. Consequently they seldom try to make a capture by tiring an elephant out. It did hap-



Belgian Congo Information Service Photo

In such country as this the great herds of elephants are gathered at this time of the year, at the beginning of the hunting season. Although this scene is typical of the behavior of the wild elephants, these are actually animals from the Station. The large animal is Guru, a monitor.

pen once, in 1928, with an elephant now named Kulimba — a Lingala word that means “Tired.” Kulimba was caught late in the afternoon when the men themselves were very tired. They tried to take her back to the base by lashing her to Jules and Guru and taking a short-cut through a swamp — figuring that Jules and Guru, being experienced monitors, could get through all right. For once their sagacity failed and all three elephants sank. Jules and Guru managed to snap the ropes that bound them to the capture, and clambered out; the new elephant saved herself only after heroic efforts and by the aid of branches that the men threw around her. She struggled up on the bank and although she was completely unshackled, she was so tired that she allowed herself to be roped again and made no attempt at escape.

Kulimba, incidentally, turned out to be a very good monitor and was one of the three selected to lead twelve young elephants 500 miles from Gangala-na-Bodio to Stanleyville in the summer of 1946 — the herd from which the three presented to the Zoological Society were selected. I saw Kulimba at the Batanado Rest Camp in the Uélé district on a September Sunday morning; she had been a bad girl the night before, attempting to escape and raising a general ruckus. To punish her the cornacs had hobbled her and tied her to a palm tree without food for twelve hours. Col. Offermann, who has a soft spot in his heart for all elephants and particularly for some of the old-time monitors that he had known at Gangala, was furious with the cornacs and ordered them to restore Kulimba to her full rights and privileges.

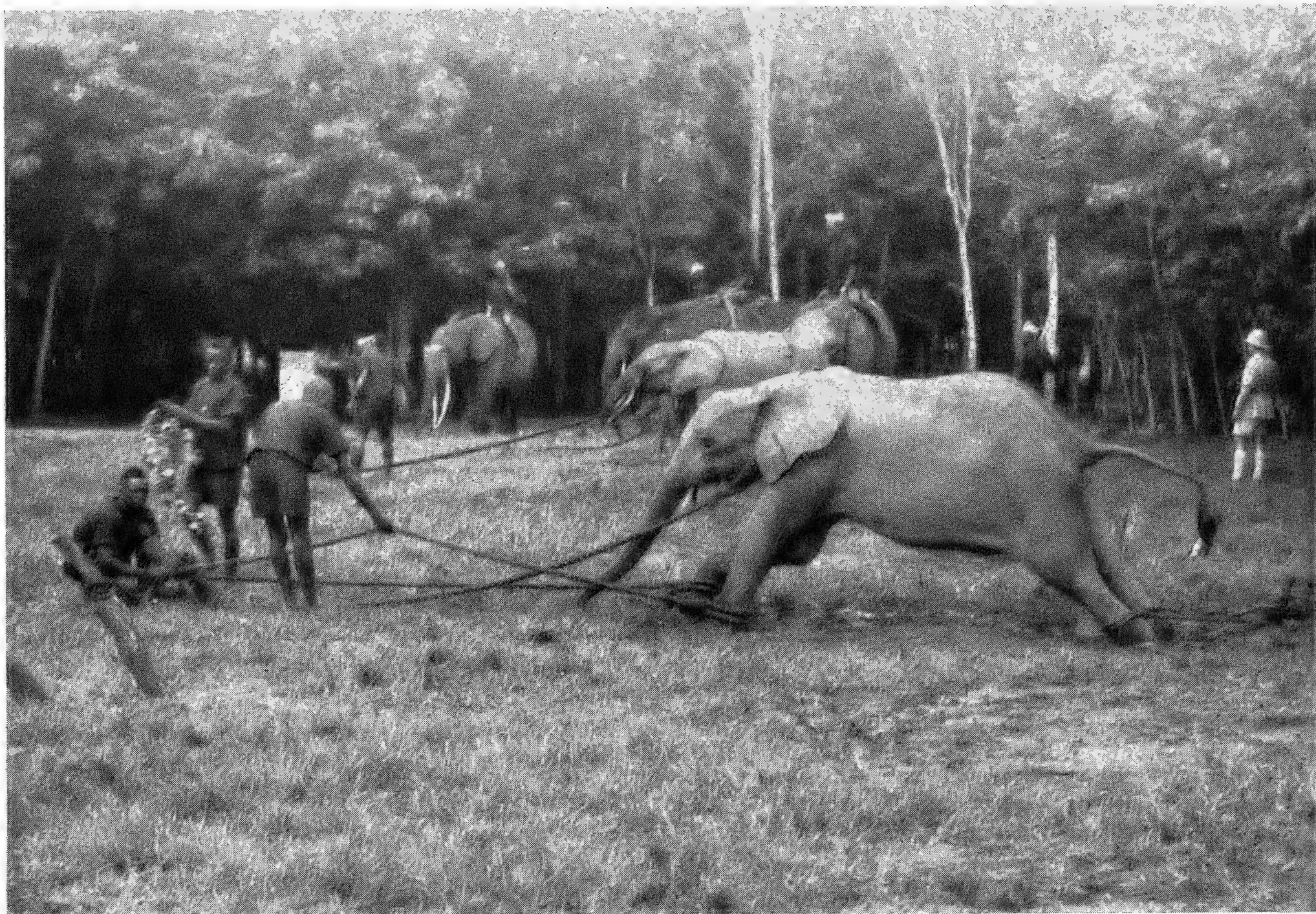
As the hunt progresses and one capture after another is brought back to the base, the base crew is kept progressively busier cutting mountains of head-high elephant grass and branches to feed the new-comers. An elephant's food capacity is enormous. In the wild they feed almost continuously, plucking grass or stuffing small branches into their mouths. They will take branches the thickness of one's finger. One night meal for an elephant in captivity — food cut and hauled in by the cornacs — is a mound of grass and branches twice as big as an office desk.

The training of a wild elephant starts in a mild way at the base camp where it gets accus-

tomed to the presence of men and to being tied to its monitor. Generally one man is assigned to each elephant and carries through its entire training. He works on the principle of gaining the elephant's confidence, talking to it continuously, singing to it, at certain stages of its education stroking it for hours with leafy branches. The elephants get accustomed to song almost as much as speech, the fierce, proud, “victory song” of *Lala-li-soi* that the hunters sing around the captures when the hunt is over and they are all gathered at the base, the *Dina-dina* marching song to reassure the elephants as they are approaching Gangala or a new camp, the nameless, almost wordless songs that are repetitious of phrase and therefore soothing to the animals. There are songs that are special to the stroking of an elephant with branches, to crossing a river, to marching, to entering a post. Some are corruptions of the songs of Indian elephant men who came to Gangala for a few months in the early 'Twenties, but mostly they are pure African. (The Indian mahouts, incidentally, did not like African elephants; they were afraid of them, and wanted to cut off their tusks).

TRAINING STARTS in earnest in “the lines” at Gangala-na-Bodio. The lines, so-called, are two parallel double rows of iron stakes set in a red brick pavement in the center of the station. There are stakes for nearly a hundred elephants and in some seasons they are all occupied. The new elephants are assigned stations and are staked down with soft ropes, either by all four feet or by the right front foot and left hind foot. The ropes are sufficiently slack so that the elephant has all necessary freedom of movement but not enough to encroach on its neighbor's area. The lines, completely open except for the low brick wall behind each row of stakes, are actually the “stables” for the station's herd, and they are tied up there at night or when they are not feeding in the bush or being trained in the training square at the end of the lines.

After a week or two of rest in the Lines, the new elephants have generally lost some of their first nervousness and are ready for training. A cornac rides up alongside on a monitor; a rope is passed around one youngster's neck and it is drawn close to the monitor. Another trainee is



The training of the new elephants requires many months—and a vast amount of patience. These are young animals, captured in the spring of 1946, and they are being taught to kneel at command. Ropes are used to pull the elephant down, until it learns what the command means.

attached to the other side. Then the new elephants feet are loosened and they go for a walk with the monitor. A cornac rides the monitor, of course, and the little party promenades and feeds in the bush near the station for several hours every day.

The next step is to accustom the elephant to a cornac riding on its back — a longer and a more difficult step. For a few days the cornacs gather around each elephant and chant *Lala-li-soi* in unison, stroking it gently with branches and tossing it bananas, sweet potatoes, pineapples, stalks of sugarcane — all delicacies that the elephants like. This soothing goes on for days, a few minutes at a time at first, then for a quarter of an hour morning and evening. Finally the morning comes when a cornac makes the first leap onto the elephant's back. There is generally a violent protest on the elephant's part and the cornac is lucky if he stays on even a few minutes. The next morning the cornac leaps again and in

a few days all but the most recalcitrant of the elephants accept their riders as a matter of course. It may take months to get some of them to accept a rider.

After two months the elephants are taught to get down and get up at command. While the cornacs keep up a running fire of soothing talk and the command "Saba! Saba!" (Steady, Steady) the young elephants are tied with short ropes that bring them down to their knees. By this time they are used to the man on their back, and when he urges "Kulala! Kulala! Kulala!" (Lie down) and tugs at the rope around their legs, the pressure, the tugging and the command all induce him to go completely down. Once he touches the ground, the ropes are slacked off and he rises. Then he is rewarded with a piece of sugarcane. In five or six days most young elephants learn to obey the "Kulala!" command readily, and learn that "Kulungula!" means "Get up!"

There are several other phases of the training



In a great field on the edge of the Domestication Station the elephants are exercised and trained in manoeuvres, each large “monitor” with a youngster lashed alongside. In center are Col. Offermann (right) and Lt. Haezaert, deputy commander of Gangala-na-Bodio station.

—the monotonous period when the cornacs with African patience repeat *dre-dre-dre* for hours while teaching the elephant to pick up a ball of grass and hand it to them with its trunk, the months when the newcomers march around and around by the side of their monitors, the stage when they are teamed up with other young elephants of the previous year and the high school student, as it were, instructs the primary class. This stage is usually reached about eight months after capture. Soon the more docile youngsters are allowed to go to the feeding ground attached to the monitor only by a single loose cord around the neck, and finally even this is removed.

Within six to eight months after capture, most elephants are fully indoctrinated and can be given their liberty; they follow the monitors docilely, with or without a cornac on their backs; they are “members of the family” and to be trusted — within reason.

The larger elephants are eventually taught to work — pulling light branches at first, then logs, then heavy work wagons. All of the cultivation at Gangala-na-Bodio is done by elephants and

good workers are in demand on the timber plantations. Their main advantage would seem to be that they are cheap to operate — the government rents them to plantations for the equivalent of about \$116 a year — and they feed themselves in the bush. The trouble comes when they break down; I heard of one plantation that rented an elephant that stepped on a sharp piece of iron and injured its foot the first year. The plantation had to support the animal in idleness for five years.

* * *

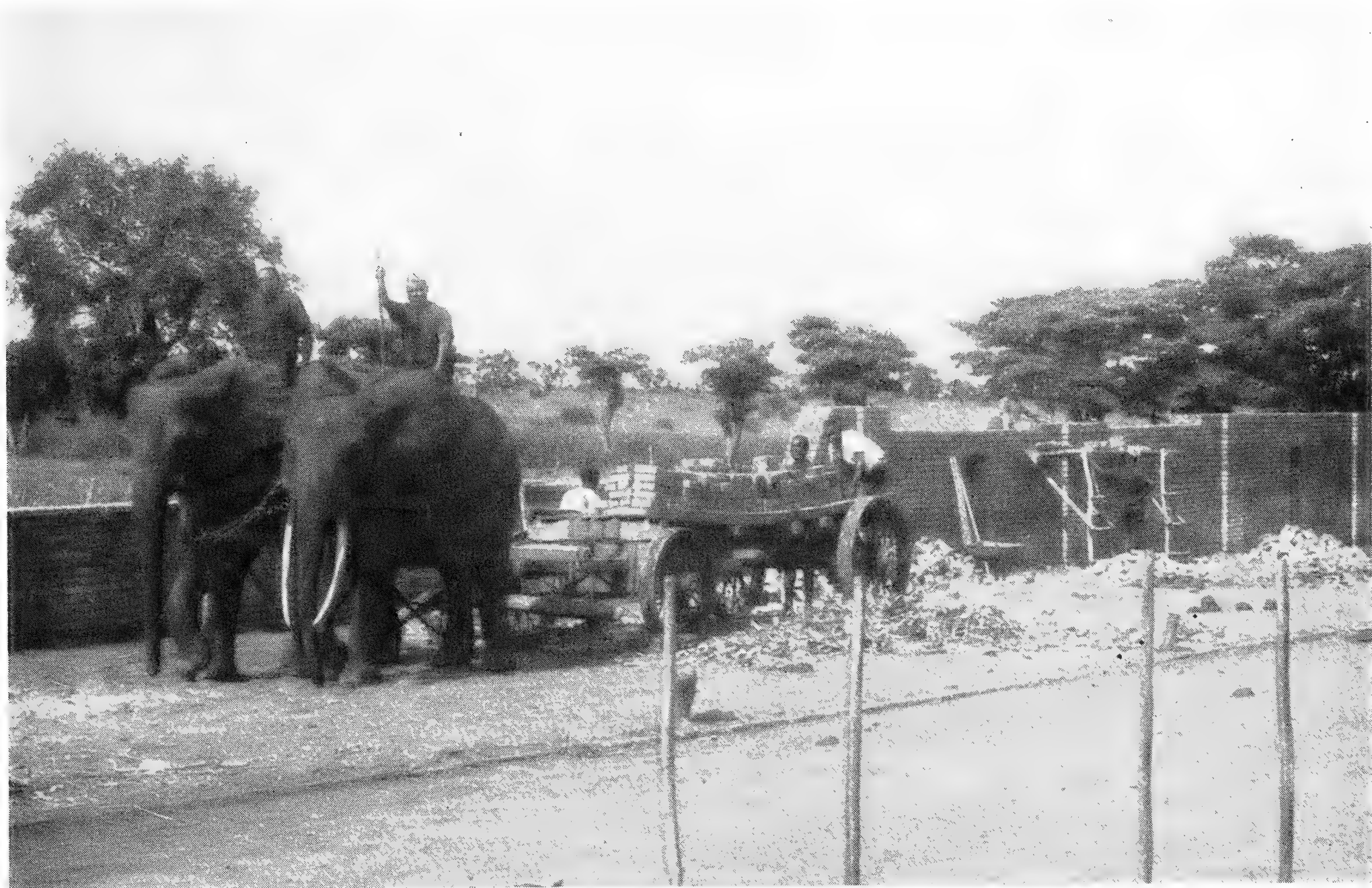
Nobody knows how many elephants there are in the Belgian Congo but Col. Offermann’s best guess is about 200,000, most of them in the Stanleyville, Costermansville and Coquilhatville provinces. Generally speaking the elephant is not in danger of extinction in the Congo, at least, despite the fact that 7,000 were killed under legal permit in 1945 and a good many more illegally — a total of around 10,000 a year, Col. Offermann thinks. Elephants have left some areas, in others they are noticeably increasing; the big forest blocks, virtually uninhabited by natives and

whites, are said to be full of elephants. Destruction of habitat is probably the main reason for their disappearance in any particular area and would explain why there are none left in the region around the famous Ekibondo village in the Uélé; I was interested to hear the chief say that he believed "the elephants knew they were being exterminated, so they went away." It was an explanation that recalled the stories about the disappearance of the Passenger Pigeon in the United States late in the last century. Ekibondo is in the center of a cotton region, swarming with villages, and there was little left to attract an elephant.

Col. Offermann admits that in the present state of game law enforcement in the Congo, his estimate of the number of elephants killed each year is a pure guess; the number could run considerably higher than 10,000. Boiled elephant meat, either fresh or putrid ("We eat the meat, not the smell," one native told me) is important to the natives, and ivory is valuable — 270 francs a kilogram, about \$3 a pound. Undoubtedly

there is a great deal of illegal killing for the sake of ivory, although elephants with tusks weighing less than 10 pounds are not supposed to be shot and females of any size are protected. White hunters and natives with modern rifles — a few of them have managed to get guns — can buy a permit for two elephants for about \$100. Natives with "pu-pu" guns — flintlocks — may have a permit for one elephant for about \$3.50. Considering the firing power of native guns, it is probably money wasted — unless the native manages to fire at very close range. In any event, elephants can be and are killed by encircling fires or pits or spears. The territorial administrator may or may not hear about it, and may not be inclined to prosecute, anyway; it is one of Col. Offermann's most delicate jobs to build up a system of game wardens throughout the Congo and try to enforce the law. It is a little like a Game Warden in New York trying to enforce the law in Wyoming in the wild and woolly days of the last century, however.

Col. Offermann, incidentally, has resumed con-



Elephants are used for all the heavy work around the training station, such as hauling heavy loads of bricks to build a wall along the side of the "Lines" where the elephants are tethered at night. About 100 elephants are at work on plantations all over the Belgian Congo.

trol of Gangala, in addition to his Game Warden duties. During the war the station was managed by Ch. Louwers.

Five elephants have been born at Gangala-na-Bodio. The gestation period of one baby, at least, was determined to be exactly 22 months. The babies averaged 85 centimeters at birth and they grew at the rate of 10 cm. a year for the first two years, afterward averaging 5 cm. a year. There is a good deal of disparity in their rates of growth, however, and the height at which they slow down or stop growing. Col. Offermann says the African elephant seems to be adult at the age of 30 years, and can reproduce at 20 — probably younger. He thinks that their average longevity in the wild is not more than 60 years, although he is convinced that, like the exceptional human being, they may attain extreme old age of 100 to 120 years. An elephant much over 60 shows the ravages of time, however — shrunken temples, prominent backbone, broken tusks and frayed ears. The oldest elephant at Gangala-na-Bodio was Colonie, captured in 1903. She died in 1946 — simply fell dead while hunting.

The African elephant has never been a favorite

of zoological gardens and circuses. Today there are only eight African elephants in the United States (four of them in the New York Zoological Park) while there are probably ten times as many of the less spectacular Asiatic species.

What's the matter with the African elephant? Such unpopularity must be deserved, but why?

Zoo men and circus men say the African "doesn't handle" well and is tricky and unstable; they say it can't be domesticated easily and thoroughly. Travellers tell of royal elephants picking their way daintily through the crowded bazaars of India, and elephant men shudder when they think of having to put an African elephant to such a test.

But there are two opinions about everything. Col. Offermann, who knows the Belgian Congo elephant better than any other man alive today, can have the last word:

"The African elephant isn't a pet and it isn't a toy, but as a working elephant it will meet any test. The important thing is to train the men who handle the elephants. With well-trained men you can get exactly the same results that you get from an Asiatic elephant."



Belgian Congo Information Service Photo

Elephants are not merely "domesticated" in the Congo, in the sense that they will tolerate human beings; they are taught to do useful work. Here a team, including youngsters, are dragging a disc harrow through fields that will later supply them with supplementary foods.

Mr. and Mrs. Charles Cordier are in the Belgian Congo now, searching for (among other rarities) the Congo Peacock, illustrated in these drawings by Lloyd Sandford. Mr. Cordier will show the drawings to the natives, as a means of finding the bird.

(New York Herald-Tribune Photo)



Taking You Along on Expeditions

By DONALD T. CARLISLE

HOW WOULD YOU like to see the Belgian Congo? Cut trails with Will Beebe in a South American jungle? Follow the opening ceremonies at the Jackson Hole Wildlife Park?

We of the staff suppose that every member of the Zoological Society has an interest in our expeditions into the field, and we are going to attempt to do the next best thing to taking you all along. As a new service to our members we will initiate a series of newsletters written in the field and flown to New York where they will be relayed to you as fast as we can make the presses and the postman run.

By the time this issue of ANIMAL KINGDOM reaches you, Editor William Bridges will be deep in the African hinterland with the Society's collector, Charles Cordier. Cordier has a list of the

rarest mammals and birds in the Belgian Congo, and, unless we are completely mistaken, this most remarkably ingenious trapper will catch a high percentage of them and send them home to us at the Zoological Park. Bridges will be right there on the trap line to report these captures play by play. Thus you will have the story of the search for the fabulous Congo Peacock, the Giant Forest Hog, a pair of Cheetahs, Sable and Roan Antelopes — the rare creatures of the Congo. You will remember Bridges' stories last year covering the Elephants and the Okapi of the Congo.

While you do not actually make this trek into the heart of Africa, you should through these newsletters feel the thrill of a great expedition — our first collecting trip in Africa in many years.

Late in January Dr. William Beebe took off

for South America on his 48th field trip for the Society. He too will send you newsletters from the jungle frontier. You will almost be able to hear the sunset chorus of bands of Red Howlers, the crashing of the Tapir through riverside underbrush, and see Jaguars slinking off into the forest.

And later in the spring we hope to bring you yet a third series of reports from Jackson Hole, when our great new Wildlife Park is completed and opened to the public. There you will see the fine herds of Bison, Pronghorn, Moose, Mule and Whitetail Deer and Elk established in their new domain with the great Tetons as a backdrop.

No institution such as ours has ever before attempted to take its whole membership along on expeditions in this way — so far as we are able to determine. This newsletter service should bring us all more closely together, for we can think of no better way in which to keep our

members in touch with the vital field work of the Society, and with the life at our field stations and laboratories.

We hope of course that this new privilege will be of great interest to our membership. We also believe it will attract many new members. We need to double our membership this year ahead. If the Society can build its enrollment to five or ten thousand in the next few years we will be in a much safer position for the future.

Help us, please, to recruit your friends to our ranks. Send us their names and addresses (a postcard will do, sent to the New York Zoological Society, 630 Fifth Avenue, New York 20, N. Y.) so that we may mail them the first of these Congo newsletters. Every member must know at least a dozen people who would like to go along with us into the heart of Africa, to South America and to our own beautiful Wildlife Park in Wyoming.

New Members of the New York Zoological Society

(Up to December 31, 1947; new Members after that date will be reported in the next issue of ANIMAL KINGDOM)

<i>Founder</i>	Comtesse de Montmorin St. Herem	Master Peter Montgomery
David H. McAlpin	John S. Dunning	Mrs. Morton C. Nichols
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	Stanley Hart	Mrs. Edwin P. Shattuck
<i>Annual</i>	John E. Hartz	Miss Dorothy Shepard
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Mrs. George S. Amory	Mrs. H. Nugent Head	Henry W. Siebern
Alexander S. Banks	Paul W. Hills	Miss Gertrude Robinson Smith
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Master Wyllys Betts	Mrs. Frederick K. Hollister	Miss Eleanor Swayne
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John Boley	Rufus J. Ireland, Jr.	John W. Taylor
Grace E. Bourne	Edwin L. Jacobs	Mrs. Read Taylor
Mrs. Philip Boyer, Jr.	Samuel Kagle	Mrs. Russell W. Todd
Samuel Brown	Mrs. Adrian H. Larkin	Mrs. Franklin Townsend, Jr.
Master Edward A. Burkhardt	Mrs. Herbert H. Lehman	Mrs. M. Brown Trimble
Frederick M. Cohen	Otto Martin Locke	Dr. Kenneth B. Turner
Mrs. Henry P. Cole	Mrs. Clarence H. Low	Bradford H. Walker
Mrs. Ann Cook	Walter P. Marshall	Samuel B. Webb, Jr.
Mrs. Charles A. Crawford	Mrs. May Davis Martenet	Walter L. Weil
Mrs. Wellington Cross	Harold C. McNulty	Mrs. Helen B. Williams
	Mrs. Devereux Milburn	Henderson M. Wolfe

BEHIND THE SCENES



News and Notes of THE ZOOLOGICAL PARK THE AQUARIUM and the DEPARTMENT of TROPICAL RESEARCH

LITTLE STORM DAMAGE

The "big snow" on December 26 seriously hampered operations in the Zoological Park for a few days, but did comparatively little actual damage. A three-cage section of the Pheasant Aviary collapsed under the weight of snow, and three White-crested Pheasants escaped, one of them voluntarily returning the next day. It was impossible to deliver food to the Lion House on Saturday, December 27, and as a result the large cats fasted on that day instead of on the following Monday, their customary meatless day. Paths were cleared all over the Park over the week-end and there were actually 1,501 visitors in the Zoo on Sunday, only two days after the snowstorm.

The ice storm the day after New Year's was more destructive than the snowstorm, damaging hundreds of trees and causing the Zoo to be closed for several hours because of the danger from hanging branches.

The day after the snowstorm, two elderly men burdened with large sacks were seen forcing their way through the unbroken drifts north of the Administration Building, heading toward Lake

Agassiz. Headkeeper of Birds George Scott investigated and discovered that they were bird-lovers who feared the wild ducks on the lake would lack food. They had brought five pounds of grain and a sack of stale bread!

Book on Pigmented Cancers

An important book on pigmented cancers, "The Biology of Melanomas," was published during January under the Consulting Editorship of Dr. Myron Gordon, the Aquarium's Geneticist. The book resulted from a symposium on normal and abnormal growth of pigment cells which Dr. Gordon organized in 1946 under the auspices of the New York Academy of Sciences. Two papers in the volume emanated directly from the Aquarium's Genetics Laboratory and two others were based on melanomas developed there.

President Osborn Honored

Near the end of the year President Fairfield Osborn was elected a Fellow of the New York Academy of Sciences.

He has also recently become a member of the Scientific Advisory Committee of the Natural Resources Council of America, and an associate member of the Society for the Promotion of Nature Reserves of London.

Heads New Society

A new organization, the American Society of Protozoologists, was formed at the December meetings of the American Society for the Advancement of Science at Chicago, and Dr. Ross F. Nigrelli, the Aquarium's Pathologist, was elected its first president.

The AAAS meetings were attended by Dr. Nigrelli, Brayton Eddy, Curator of Reptiles and Insects, Dr. Myron Gordon, the Aquarium's Geneticist, and Samuel H. Ordway, Jr., as well as by several Fellows of the Society, including Drs. Lester R. Aronson, Alfred E. Emerson, R. K. Enders, J. Paul Scott and Horace W. Stunkard.

ELWIN R. SANBORN

Elwin R. Sanborn, the man to whom the Zoological Society owes the foundation of its great collection of more than 23,000 photographic neg-



Early in February we plan to open an exhibition in the Heads & Horns Museum of 60 news photographs by Arthur Sasse, International News Photos cameraman who has specialized for many years in animal pictures—and especially animal pictures made in the Bronx Zoo. This is Sasse and some of his little Zoo friends.

International News Photo

atives of wild animals, died on December 19 at the age of 78. He had retired from the service of the Society at the end of 1934.

Mr. Sanborn began his career in 1899, the year the Zoological Park was opened to the public. In those days cameras and negative emulsions were not what they are today — indeed, some of the apparatus that the Zoo's official photographer used successfully would be museum pieces today. Nevertheless, endowed with infinite patience and a determination to get nothing but the best possible results from the equipment at his command, he worked indefatigably for many years and as a result the early negatives in the Society's collection are often not surpassed by those obtained later with much superior equipment. Composition and needle-sharpness of the essential parts of the photograph were his constant concern.

Not only did he lay the foundation for our collection of mammal, bird and reptile negatives, but he established a photographic collection for the New York Aquarium after it was placed under the direction of the Zoological Society in 1902. Here, too, working with cumbersome equipment and for many years with flash-powder illumination, he achieved some of the greatest fish pictures — pictures that are still in constant demand from our albums.

Besides taking the Society's photographs, he edited the magazine, known then as the "Bulletin," often writing and illustrating articles. He made a photographic record of the liberation of the American Bison Society's herd in the West, and photographed the late Dr. Charles H. Townsend's expedition to the Galápagos Islands in 1928.

Look for Your

CONGO NEWSLETTERS

YOU WILL FEEL almost as though you are in the jungle when you read the bulletins that will soon come to you hot off the typewriter of our editor William Bridges — now in the Congo with the Society's own collector Charles Cordier.

The Congo Peacock, Giant Forest Hog, Okapi, Mountain Gorilla, Sable Antelope — these are a few of the "wanted" items on our list. Bill Bridges will report the incidents of the search play by play.

Read these newsletters. Call them to the attention of your friends.

This is the first time any organization such as ours has attempted to take its entire membership into the field. Be sure to come along — and let us know how you like the trip.



If you want extra copies of any of these newsletters write to:

MEMBERSHIP COMMITTEE
New York Zoological Society
630 Fifth Avenue
New York 20, New York

ANIMAL KINGDOM



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THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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Talking About Animals

EVERY NOW AND THEN I am invited to give a *talk* — some people refer to the episode as a *lecture*, which is a discomfoting term. Nobody likes to be *lectured*. I never feel too sorry for the audience as I invariably show some colored motion pictures from the Society's film library and let *them* do most of the talking. The films produced by our staff in recent years are truly remarkable as all our members who have seen them at the annual meetings, and others, will agree.

For my part it is never tiring to see these films over and over again, so fresh are they and so infinite in variety of subject matter. In the latter regard I have recently found myself suggesting to the members of an audience that they, by some trick of will, try to open their minds wide and pretend to themselves that they have never seen animals before, and, as they view the pictures, to attempt to conceive how it has been possible — through the miraculous concatenation of time, circumstance and environment, namely evolution — for Nature to have produced these living forms of the earth, of the sea and of the sky — whether elephants, sea horses or hummingbirds — each designed for its special environment, all being dynamic expressions of life, living here with us human beings on this earth to enjoy, to study and to protect.

Fairfield Osborn

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THE NEW CONSERVATION FOUNDATION

“A Challenge We Must Accept”

By FAIRFIELD OSBORN

OUR INSTITUTION is met with a challenge that it intends to accept. This challenge stands before us. We cannot evade it or run away from it.

The future of our country is threatened by the increasing misuse and destruction of its life-supporting resources. These resources cannot be listed in the order of their priority or, let us say, of their relative importance when compared one with the other. The reason for this is that all living natural resources comprise an integer, which is another way of saying that each is dependent upon all the others. We are compelled to recognize, therefore, that animal life in all its forms, forests and other plant life, water sources, and finally productive soils, are in truth but four elements in a component whole. During the first half-century of its existence the Zoological Society directed its energies almost exclusively to the conservation of animal life. We are faced with the inescapable fact that it is not possible to conserve animal life without at the same time preserving its natural environment of vegetation and water resources. In a different context, it may be pointed out that zoology is not actually a separate science but can more truly be thought

of as an integrated part of the *living sciences* that fall under the general term of biology.

Our institution, in its very essence, is dedicated to public service. Consequently, when it becomes apparent that the future welfare of the people of our country, to say nothing of the peoples of other countries, is being imperilled because we are still riding the downward spiral as far as the conservation and wise use of life-supporting resources is concerned, it is time to take action and do everything that lies within our power to reverse the present destructive trend.

In order to accomplish this task in the most effective manner possible we are in the process of establishing a corporation to be known as “The Conservation Foundation,” under the sponsorship of the Society, which has received its charter under the laws of the State of New York. It is provided in the By-laws that the trustees of the Foundation shall be designated by the Society. The key clause, descriptive of the purposes of the Foundation, reads as follows:

The objects and purposes for which the corporation is formed are to promote conservation of the earth's life-supporting resources—animal life, forests and other plant life, water sources

and productive soils—and to advance, improve and encourage knowledge and understanding of such resources, their natural distribution and wise use and their essential relationship to each other and to the sustenance and enrichment of life.

We are proceeding upon the assumption that the value of the Foundation's work will depend upon its ability to accomplish results in two closely correlated fields of effort—fact-finding and research on the one hand, education and the dissemination of information on the other. We recognize the fact that as matters stand today our own country's welfare is directly influenced, for better or for worse, by conditions prevailing in other parts of the world. Representatives from abroad have been included on the Advisory Council which has already been formed, not only in recognition of this fact but also because it is felt that the new Foundation can gain greatly from the knowledge and experience of those in other countries. The work of the Foundation will be directed primarily upon the problem in the United States, although the international implication will not be lost sight of.

The initial planning and administrative staff has been brought together during the past year and, until now, has operated as the Conservation Division of the Society. Already much has been accomplished as will be evidenced in our forthcoming Annual Report, as well as in a special presentation of plan and program which can be had upon request. The members of this staff are: George E. Brewer, Jr., Samuel H. Ordway, Jr., A. William Smith, Robert G. Snider. They will form the administrative personnel of the new Foundation.

Further, an Advisory Council has been established whose present members are:

Mr. Harold Coolidge, Executive Secretary, Pacific Science Board, National Research Council

Mr. Charles Sutherland Elton, Director of Bureau of Animal Population, Oxford University

Dr. Harry Godwin, Fellow of Clare College, Lecturer in Botany, Cambridge University

Dr. Caryl P. Haskins, research scientist in biology and related bio-physical fields, New York

Dr. A. V. Hill, Honorary Professor of Physiology, Biophysics Research Unit, University College, London

Dr. G. Evelyn Hutchinson, Osborn Zoological Laboratory, Yale University

Dr. Aldo Leopold, Department of Wildlife Management, University of Wisconsin

Dr. Paul B. Sears, Department of Botany, Oberlin College

Dr. V. van Straelen, Director of the Royal Museum of Natural History, Brussels, and President of the Institute of National Parks of the Belgian Congo

Mr. William Vogt, Chief of Conservation Section, Pan American Union

Dr. Alexander Wetmore, Secretary of the Smithsonian Institution

Every member and friend of our institution will no doubt immediately recognize that we are about to undertake a formidable task. Ideas are useless and plans are meaningless without the resources with which to fulfill them. Throughout the past half-century our Society owes its growth and accomplishments to the interest and support accorded to it by its members and friends. Now, in the early stages of the second half-century of our work we are entering upon this great new endeavor whose ultimate success depends in large degree upon the financial resources that may be made available to it.



Australia's Marsupial "Tiger Cat"

By DAVID FLEAY

IT CAN BE TRUTHFULLY SAID that predatory creatures kill to live, for such is the basic principle of their lives. But in Australian forest country one of the marsupial carnivores definitely lives to kill.

This is the Spotted-tailed Dasyure (*Dasyurops maculatus*). It became the Tiger Cat to early settlers and although it is quite without relationship or similarity to members of the feline family, it nevertheless remains the Tiger Cat to all who live in the gum tree country.

Dark brown or reddish-brown in color, with conspicuous white spots, the Tiger Cat is superficially civet-like and short legged with a mode of progression that might be described as a humpy bounding gallop.

Captain Phillip, who saw the animal near the present Sydney, N.S.W., and was the first to

describe its existence, named it the "Spotted Marten" and described it as not only very ferocious but also exceedingly stubborn. In fact, many accounts of its pluck as a fighter are to be met with in works dealing with earlier days of Australian colonization.

About the size of a large and heavy domestic cat but possessing powerful jaws with an amazing gape and equipped with exceptionally prominent canine teeth, a male Tiger Dasyure is indeed a creature to be reckoned with. The presence of a first toe and serrated pads on palm and sole indicate that the animal is at home as a tree climber. Largest specimens are found in Tasmania, and one very light brown and very big individual from that island, which arrived at the Melbourne Zoological Gardens in 1933, measured four feet from nose to tail tip. With its gleaming canine

teeth characteristically projecting beyond the closed lip of the upper jaw, with mouth opening widely to display its whole slashing armament, and taken in conjunction with the powerful crouching body, this pink-nosed animal was truly dangerous — indeed with its quickness much more dangerous to handle than a Tasmanian Devil.

The existence today of the Tiger Cat — largest marsupial carnivore on the mainland — is precarious indeed, and only in Tasmania can this spotted and primitive-looking creature be said to exist in any numbers at all. In spite of protection, the inflexible resolve and single-minded purpose of this nocturnal hunter, who insists primarily on his own warm-blooded kills, constantly brings about his own undoing. I have had a number of experiences bearing on the Tiger Dasyure's suicidal insistence on cleaning up all and sundry in poultry roosts.

During January, 1946, at beautiful Lake St. Clair in west central Tasmania, we camped with A. D. Fergusson, the ranger of the 365,000 acre

reserve. He had several dozen chickens which roosted each evening some twenty feet high in trees by his hut. One night a wandering Tiger Cat scented them and climbed aloft to seize each one in turn by the neck, simultaneously killing it and falling with the body to the ground. Repeating the performance until not a chicken remained and spurred on by the taste of fresh blood, he finished up by assassinating two ducks. Three nights later what was probably the same animal killed six chickens at another home three miles distant. There they knew he would return for more — and caught him easily in a nest of rabbit traps not even buried in the ground.

Because he lacks the caution and cunning of more highly developed predatory mammals, it is obvious that despite protection this marsupial killer cannot exist side by side with settlers — who, of course, must and do protect themselves. Its only chance of long survival lies in the wild mountainous, uninhabited, regions of western Tasmania where, along the wild animal trails, it is confined to its own native game. In Victoria



G. M. Crowl Photo

Rainy, mountainous region of south-western Tasmania, the haunt of Tiger Cats, Tasmanian Devils and Thylacines. Mr. Fleay center of group. Foreground shows typical clump of button grass.

the Tiger Cat is almost restricted to the Otway Ranges in the south of the state. Nevertheless, following the tremendously wide-spread fires of 1939, the numbers of this forest-loving animal have been reduced still further.

Though I had trailed and captured Tiger Cats back in 1932 in the Victorian Otway Ranges, it was not until the summer of 1945-46 while seeking the Marsupial Wolf in south-western Tasmania that I really crossed trails frequently with the Tiger Cat in its native environment. Each evening in that rainy mountainous region it was a regular practice to drag up to 5 miles of "scent" trail along animal pads in thick gullies and over button grass swamps from one strategically-placed drop-door trap to another, so that a Marsupial Wolf living in the vicinity would be lured (we hoped) by the enticing odor of half-cooked wallaby or singed parrot to follow along with favorable consequences. That we did get a "Wolf" into a trap is another story; but it was a fairly common thing to have Tasmanian Devils, Tiger Cats and small native cats (*Dasyurus quoll*) also blundering in where angels feared to tread, and where they were really not wanted. The weather never remained fine for more than two or three days at a time with the result that each morning on a round of the traps it was possible to pick out soft ground tracks of the preceding night. We were thus afforded a fascinating study of the imprints that told what creatures had come across the scent trail and had followed it. Tiger Cat prints ran for long distances if the odorous Green Rosella Parrot had been the lure. One big fellow must have traveled four miles one night before reaching the first trap on the circuit, but, being suspicious, he had walked right round it and away again. The following evening a dead parrot on the hook and a sample outside proved irresistible. I came around to find the dasyure securely caged and absolutely fighting mad. With mouth widely agape and tail acutely bristled, he jumped at me from side to side, from end to end, and from bottom to top of the big chain-wire trap. His abrupt, piercing, "circular saw" screams were ear-shattering, and if ever a man found himself in a quandary about single handedly bagging such a savage specimen, I was that one. However, one of his headlong charges eventually carried him, neck and crop, into a large chaff bag,

and so he was set for portage back to camp. The faeces of this animal showed that his last meal had been the thick-furred Swamp Rat (*R. lutreolus*) but in this Tasmanian region the Tiger Cat preys upon native hens (*Tribonyx*), Pademelon wallabies (*Thylogale*), birds in general and their eggs, and rat kangaroos of the genera *Bettongia* and *Potorus*. The Tiger Cat exhibits that curious preponderance of the male sex so typical of some other carnivorous marsupials and the female animal is usually two-thirds or even half the size of a typical male.

In the early 1930's, I had set out to discover something of the Tiger Cat's family life, for no one had ever bred the animal. The whole trouble was to obtain a female, and with that end in view every incentive had been placed in the way of inhabitants of the Otway region, where I had left large box traps. One day an enthusiastic telegram heralded the arrival as stated and as we fully expected of the long sought "lady." But alas, unpacking following the arrival of the western district train revealed a simple but all important mistake in identification! It was another, and our fifth, "gentleman" Tiger Cat.

However, like most long-cherished ambitions, our hopes were eventually realized, and thanks to the Fry family, of Laver's Hill, a female Tiger Cat was captured in the late summer of 1935. So ended five years of difficult quest. Actually the animal was accidentally caught in a rabbit trap and on arrival it was necessary to amputate an injured fore limb right to the elbow. Being of a hardy disposition and enjoying the seclusion of a comfortable hollow log, the animal made a good recovery. With no lack of fresh rabbits, rats and occasional birds, the Tiger Cat soon learned to accept the curtailment of her usual bush wanderings as a fairly kind fate.

On April 5, 1935, with considerable trepidation (justifiable in view of the tragedy two years later, of a male Tiger Cat killing and partly devouring his mate), a male Tiger Cat was placed in the enclosure with our precious female. Clashes between individuals of this species are sharp and may be almost instantly fatal. They are accompanied by a series of the sharpest and most ear-splitting sounds of "sshah"! — so forcefully uttered as to sound like a blast of a circular saw or of escaping high pressure steam. One animal

The Dasyures are not only stubborn but extremely vicious. Their powerful jaws are equipped with long canine teeth. This photograph shows the required method of handling.

may spring upon the other and sink its keen teeth into the unfortunate's neck. Such a killing occurred before our very eyes in the case of two Male Tiger Cats at the Melbourne Zoological Gardens in 1934.

At any time a Tiger Cat, whether male or female, "greet" all and sundry with slightly gaping jaws and repeated threatening low-pitched hissing undertones. It is definitely a warning to heed! Thus it can be understood that a certain amount of nervousness accompanied the risking of our first and only female Tiger Cat with another of her own rather unsociable kind. Fortunately all went well, possibly due to the extreme quietness of the crippled female. She was definitely not one of the nagging kind.

According to observation spread over this and two other breeding seasons (1938 and 1939), the pairing season is very clearly marked in Victoria and extends over June and July. This is the period when (whether young are born or not) the pouch develops from its inconspicuous resting condition and becomes a glandular pocket-like area. Actual pairing of the animals is a prolonged activity, during which the female suffers severe lacerations about the neck and shoulders. During such times piercing, ear-splitting shrieks are frequently heard by night and day. The gestation period occupies approximately three weeks. In the case of the crippled female, five minute pink "joeys" appeared in the pouch on August 10, 1935. Usually, however, offspring appear in the pouch during July.

Arranged in two curved rows on each side of the longitudinal median line of the pouch there is a total of six mammae, compared with eight in the smaller Native Cat and four in the case of the Tasmanian Devil. Not so well formed as in the case of its relative, the Devil, the Tiger Cat's pouch is nevertheless more perfectly developed than in the Native Cat. It is a fairly deep receptacle and opens into a pocket anteriorly—in other words, unlike a kangaroo's pouch, it extends forward toward the animal's chest and not backward toward its tail.



I was unable to witness the actual arrival of the embryo Tiger Cats in the pouch, but the position and actions of the mother in this 1935 season were described to me by Ernest Walsh, an observant keeper in the Australian Section of which I was Curator in the Melbourne Zoo. Subsequently, on July 17, 1938, when young actually arrived in the case of another female Tiger Cat, which successfully produced and reared the two successive broods during 1938 and 1939 at Badger Creek, I watched most carefully, noting restlessness on the part of the mother, and being particularly interested in the attitude of these carnivorous marsupials at such a time as compared with the known posture of the herbivorous kangaroos and wallabies. During mid-morning on this date the mother sat, or rather crouched, in a corner of her enclosure, with her back quarters raised slightly from the ground. She remained in this rather stiff strained position for an hour and a half. The tail was simply curved around beside her body, and not under it, as has been observed in wallabies and kangaroos. Apparently the young were born and



S. A. Pearl Photo

betook themselves to the pouch during this period. It was impossible to make closer observations and the above is only assumption. Still, the young were in the pouch later in the day, and the attitude described corresponds with that observed by Mr. Walsh at the Zoo in 1935.

Knowing the cannibalistic traits of the smaller and larger relatives of the Tiger Cat, I removed the male parent immediately on seeing that the mother's pouch was occupied.

The 1935 litter of five young animals consisted of three males and two females, and it is of interest to indicate the outstanding features in the gradual development of the little fellows. Measuring 7mm., or roughly a quarter of an inch in length in their curled-up posture, and colored pink, the offspring are literally mere dots at birth.

It was most difficult to follow out observations at any time, for an inspection meant lifting the mother up by the tail — and anyone who has seen (and felt!) the business-like teeth, or shrunk

from the ever-gaping jaws, of a Tiger Cat, will realize that this is not easily done. Moreover, for the welfare of the young, it was unwise to repeat such performances too frequently. At four weeks of age the babies had increased to 38 mm., or 1½ inches, in body length, and though still well anchored to the mammae they showed considerable limb movement. One or more of them would now hang outside the pouch when the parent was suspended by her tail. At seven weeks dark brown fur, which had gradually been making its appearance — first of all on the large and well-formed heads (young marsupials develop very obviously from the head end backwards) — was well developed, with the relieving pattern of lighter spots. Most important of all, the eyes were beginning to open. The young Tiger Cats, though still tenacious in their grip on the mammary glands, were no longer constantly attached to them and frequently now lay sleeping in the nest. The attachment of the young to the mother until reaching this age is, in its later stages, a

Twelve weeks of age finds the young becoming very active. But a slight disturbance—and they will scurry back to cling with all four feet and teeth to the parent's back.

tremendous handicap in her nocturnal forays in search of food. It is during this period, as I have noticed in several related marsupials, that highest mortality is liable to occur. One or more of the many offspring is apt to drop off and become lost and the mother herself has no speed to escape from pursuers. Approaching and at the age of twelve weeks, the young *Dasyures* displayed a surprising and rather attractive color "phenomenon," typical, as far as I have seen, of all three "broods" in 1935, 1938 and 1939. The future creamy-white body and tail spots were now definitely pinkish, with the abdominal region of a similar tinge. This is a phase that gradually fades, until within a few weeks it is not noticeable.

From twelve weeks of age onwards the little Tiger Cats became increasingly lively and interesting, though any fright or unusual happening was the signal for them to cling tightly to the fur of the mother's back and sides, gripping tenaciously with all four feet and teeth as well. Though handled a great deal the "broods" in all cases remained unremittingly savage and wild. In order to observe the many delightful antics of the "play age," it was essential to remain quiet and hidden from view. With bristling tails the little fellows would sneak furtively toward some object and then bolt erratically away. They also indulged in fast wrestling and biting bouts, tackling each other chest to chest.

Feeding themselves from whatever food the mother brought in from the age of 14 weeks onward, the young also still drew spasmodically for a time on the mother's own nourishment. However, at 18 weeks or roughly 4½ months of age, they were entirely independent and self-supporting and one-third grown in relation to the size of the mother. Ungrateful, as is so often the way in life, they even moved their quarters and

"camped" away from the mother who had tended them so long and carefully.

The differentiation in size between males and females does not show in any marked degree until the Tiger Cat is some 18 weeks of age. From then on the male develops into a stronger, more robust and larger animal altogether. Maturity is reached within 12 months, while the life span appears to be but six years. Young animals appear to occupy nearly two years in reaching their full size.

With the idea of endeavoring to re-establish Tiger Cats in an area remote from settlement, two pairs of these youngsters bred in captivity were taken late in 1939 to Wilson's Promontory, a mountainous National Park some 30 by 15 miles in extent, and there liberated. So far there has been no news of them, which, however, is not surprising, considering their nocturnal habits and the rough, scrubby, nature of their new habitat. We simply hope for the best with somewhat mixed feelings about other native game in the area, but knowing of course that the ubiquitous rabbit is a splendid means of livelihood for any smart Tiger *Dasyure*.

At eighteen weeks the Tiger Cat becomes totally independent of its mother. This four months old *Dasyure* is already showing signs of its notably vicious Tiger Cat disposition.





The Worm Farm

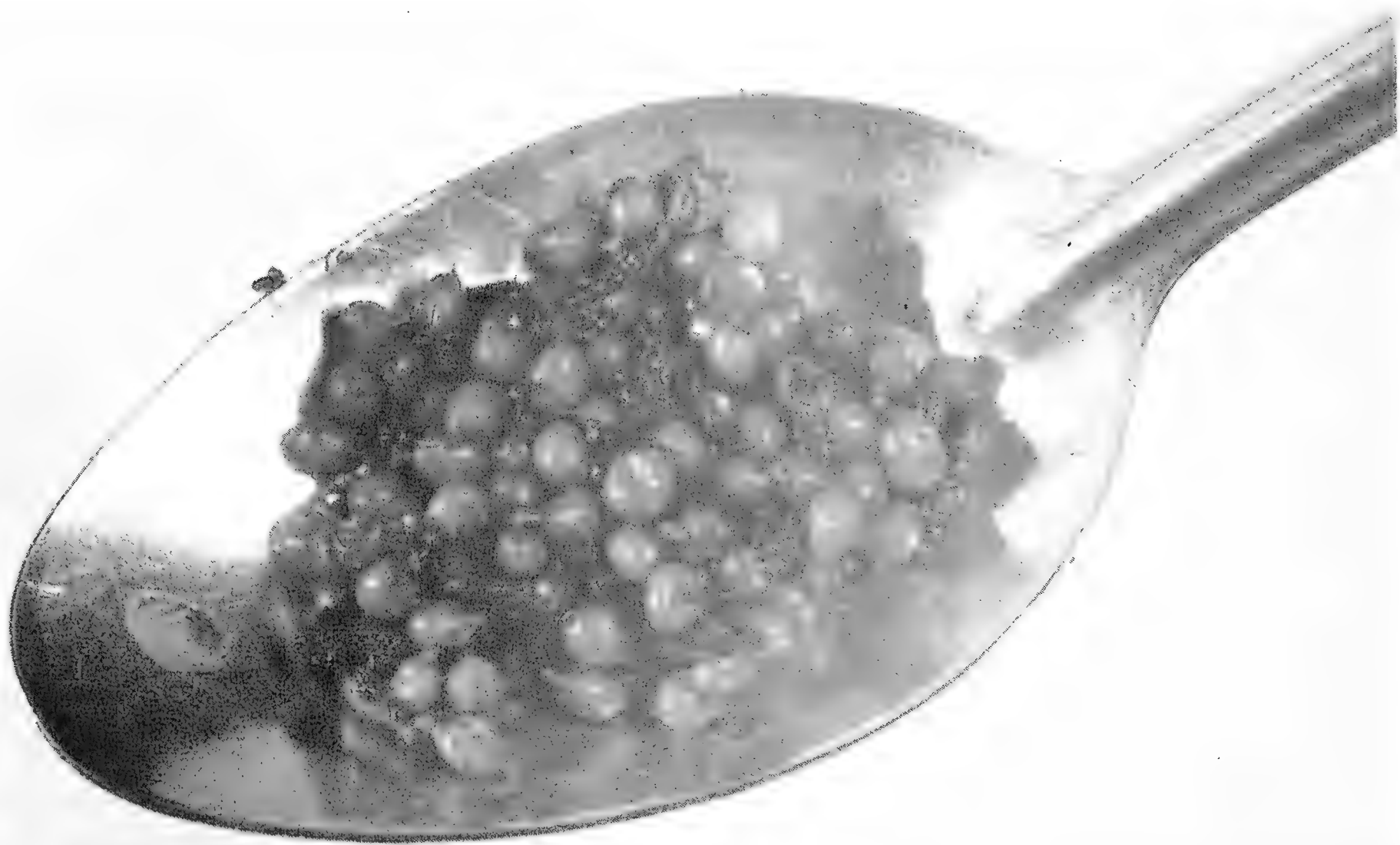
Long before our platypuses arrived last April, preparations had to be made to satisfy their fabulous appetites. At least 25,000 earthworms had to be provided for them each month. And so the Worm Farm came into being! In the cellar of the Lion House, Curator-Aquarist Coates assisted by the Aquarium's crew established a battery of breeding boxes and a series of growing pits specially designed to produce astronomical numbers of the staple diet of the platypuses. Here is a pictorial story of our worms — from egg to platypus.

Our original worms were purchased from dealers. Curator Coates inspects a new shipment.



In these breeding boxes worms lay eggs which hatch under carefully controlled conditions.





A hundred-and-fifty of these tiny, delicate earthworm capsules hardly fill a teaspoon. It takes about three weeks for the capsules to hatch. Wormlets are transferred into growing pits.

Food for the worms is "planted" in the soil of the pits. Tankman James Malcolm first digs a trench, then fills it with assorted garbage (specially selected) and finally covers it over.





What a well balanced worm diet contains. (L. to R.)—Stale pastry, peapods, sour milk, egg-shells and apple skins, toast, ashes, cornmeal, citrus skins and decayed fruits and vegetables, sand, coffee grounds, Pablum, dry leaves and newspapers. Dinner-time and the worms seem to like it!





Collecting hundreds of worms daily for the platypuses' dinner is no easy job. Tankman Thomas Callahan carefully sifts them out while Keeper of the Platypuses, Johnny Blair, looks on. Each day Cecil, Betty and Penelope receive a total weight of two-and-one-half pounds and needless to say the platypus portrait depicts the worms' ultimate end.

Ladies in the Dark

By BRAYTON EDDY

IT IS A BOAST in California that they have a spider which can dig a hole in the ground, then pull the hole in after it. This is not strictly true. But they do have a spider which can dig a hole and close it with a trap-door. This I have wanted to see for fourteen years. When last October a wooden box about the size of a Brownie camera was delivered at the Reptile House, I knew my time had come. Some months earlier I had dropped a hint in the ear of a member of our Society from the Pacific Coast and now it was bearing fruit.

Eagerly I pried the lid from the package while the expressman awaited his receipt. Eight . . . Yes, there were EIGHT California Trap-door Spider¹ burrows packed as snug as you please in strips of tissue paper. As I examined one carefully to see if it were cracked, the expressman turned his back in disgust.

"Now I've seen everything," he confessed. "Wait 'till I tell the boys I've been delivering post holes to the Zoo!"

As a matter of fact, the term wasn't out of place. They did look like post holes of a miniature variety. The largest one was only five inches deep, although in California they sometimes exceed ten inches; and in circumference it could barely accommodate the end of a broom handle. But each hole was fitted with a lid and was surrounded by adobe soil so hard and firmly baked that it could be dug up, spider and all, and shipped across the country without mishap.

The spider concerned is but one of at least sixteen species found in the United States. All of them dig holes in the ground but not all of

them are hole-closers. Our female specimens average $1\frac{1}{3}$ inches long, have a lacquer-brown cephalothorax and a plush-brown abdomen. The legs are somewhat hairy and the feet terminate in short sharp claws. The venom-delivering jaws are hard and black, not made for chewing but for crushing. The liquid parts of the food are drawn into the mouth by a sucking stomach.

The first thing noted about these female spiders was their extreme sluggishness. We could poke them about with a straw and they were not in the least inclined to bite. All day long they stayed in their burrows, and only the occasional disappearance of an insect supplied them for food led to the conclusion that at least some of them were active at night. To make certain they did not starve, we pried open the lids of their tunnels now and then and flipped in a crushed mealworm. Doubtless in Nature they would long ago have disappeared from the earth had they not chosen a subterranean existence.

Even with a knife blade, however, it is no easy matter to pry open a trap-door. It fits like a stopper in a flanged hole, and the little lady who designed it clings desperately to the lower surface with fangs and claws to keep it shut. The top third of the burrow is her listening post. If it is night and she is hungry, the slightest earth tremor of a sowbug prowling near will cause her to raise her lid, seize the careless fellow and disappear with him like a regular jack-in-the-box. After the manner of a persistent salesman, she is careful at such times to leave a foot in the door — or even the tip of her abdomen — so she cannot be shut out.

The venom of these spiders is quick acting on

¹ *Bothriocyrtum californicum* (Cambridge).

sowbugs and small insects, but is not considered dangerous to man.

In order to measure the resistance each spider would offer to an upward pull on its trap-door, we inserted near the outer edge of each lid a fishhook which could easily be rigged to an overhead platform scale. Because the lid was hard and difficult to penetrate, being reinforced with the same adobe Mexicans use in their sundried bricks, we had to moisten it well to prevent chipping. In three days the spiders had settled down to normal and

the tests to measure their strength were begun.

By raising the scale itself, once a contact was made, the finger on the dial registered the weight of resistance up to the time each spider let go. To determine the actual resistance of the spider, it was then necessary to subtract half the weight of each trap-door and the full weight of the rigging.

Various figures have been suggested for the resistance a trap-door spider can exert at such a time. Lee Passmore estimated ten pounds, where-



Some of these spider nests are more than ten inches in depth. It is very difficult to cross-section them because the walls are made of a hard sun-baked mud and lined with silk.

as Walker Van Riper with a spring scale recorded fourteen ounces. Our average was less than 4 ounces (123.05 grams), but it may be that the spiders tested let go sooner than normally because we had occasionally pried open their doors to throw in food. After offering a token show of resistance, they may have released their hold thinking it was mealtime. However that may be, no spider that tips the scale at 3.232 grams need be ashamed at resisting a pull of 123.05 grams or 38 times its own weight. For a man weighing 175 pounds the equivalent would be 6650 pounds or well over 3.5 tons.

There are at least two occasions when a trap-door spider does not stand guard in her home: when laying eggs and when shedding her skin. At both times the door is sealed with webbing or earth against intrusion. It may remain sealed for seventeen months, but that is most unusual.

The eggs, from two to three hundred in number, are encased in a silken sac down at the bottom of the burrow. When the spiderlings hatch they commonly remain in the maternal home for several months until strong enough to venture forth into the outside world. There they seek high ground from which to play out their silken threads until ascending air currents lift them off their feet and send them ballooning into the air. By hauling in the threads, they can settle back to earth again. If the new terrain is suitable for homesteading, they will proceed to dig in using the spiny rakes at the side of their young jaws as tools.

The digging is generally done at the close of the rainy season, when there is least likelihood of a cave-in. Each particle of soil is carried aloft in strong front feelers. The inside walls are made firm by the spider pressing her jaws against them, when a glazing of saliva and a lining of silk is

When shadows lengthen at close of day, the Trap-door spider raises the lid of her dugout and ventures forth. One foot is left in the door so it will not shut tightly behind her.



added. Apparently the silk lining is carried upward to form part of the hinge and door, the latter being strengthened and weighted by having alternate layers of dirt added to the underside. Only the final layers are of pure silk. When the spider is resisting intrusion, she grips this part of her door with jaws and claws and braces herself for the pull.

The actual construction of an underground retreat is said to take from 12 to 16 hours. As the owner grows in size, she must enlarge it by cutting away the walls and adding some of the material to the circumference of the door. At least one part of the tunnel is kept large enough for her to turn around.

With growth, even the spider herself must



Spiders have four pairs of legs, but in front of these are a pair of leg-like feelers. The male feelers of the Trap-door Spider, unlike those of the female, have near their tips a bulbous process and a spine which are used in egg fertilization. The circular picture is a photomicrograph and clearly shows the unusual formation of the leg-like feelers of this male spider.

undergo a change, which is for her a very critical period. Since she cannot stretch her outer cuticle and it has no hems or tucks to let out, she must discard it completely like a soft-shelled crab and be relatively helpless until a new one is formed. First the back plate is shed, then the abdomen is withdrawn and the legs are pulled from their casings. Except for the wrinkled abdomen, the final molt might be mistaken for the spider.

Now the little lady has acquired that *new look*. Lee Passmore, who with Francis Beck has probably observed the shedding of a trap-door spider more closely than anyone else, states that she resembles an almost transparent wax model that reflects light like glass. Even her fangs are white. Only her eyes, abdomen, and the coarse hair on

her legs show color. But in three hours, the skin darkens and in two days it matches the old one.

No adult male trap-door spider has been observed voluntarily to enter a female burrow. It would be extremely risky for him to do so. Her body is nearly twice his size and her kind have the reputation of being bloodthirsty. Most certainly she could not enter *his* burrow because it is too small. Although no description has been found of their mating behaviour, it has been suggested that a gallant male plights his troth on the threshold of her home.

As a matter of fact, males are reputed to be rare. We can at least vouch for the fact that they are elusive. We did not know we had one until the day after the burrows were placed on public

exhibit. That morning a veritable black knight appeared, scarcely three-quarters of an inch long, with abdomen of chocolate-brown. His front feelers, instead of being rounded at the tips, had attached to them a bulbous segment ending in a spur. Evidently he was locked out of his home, for upon examining one of the smaller burrows, we found it empty. He was surprisingly active in avoiding our attempt to return him to it again.

That these spiders are individualists to an amazing degree is evident. They do not make social calls on their neighbors, nor will they occupy the burrow of a deceased. Indeed, except at ballooning time, the territory they cover is largely restricted to the area within reach of their homes.

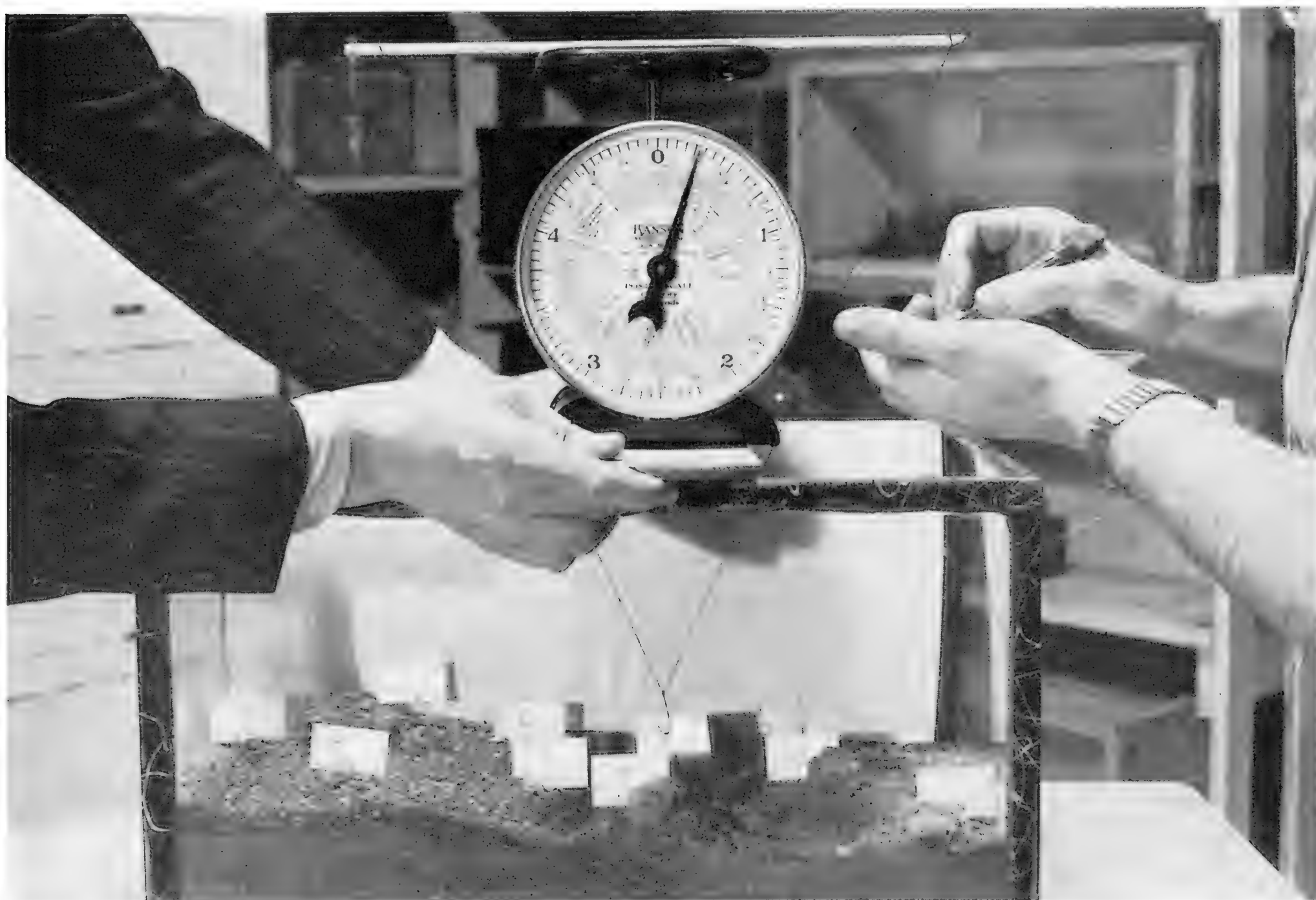
Once in prying open the trap-door of a female burrow the hinge was broken. I tried to persuade the tenant to occupy another burrow which was empty and in good repair. But she refused. Only after repeated efforts was she poked backwards

down the shaft and the door closed behind her, but no sooner did we turn around than up she popped again. Several days afterwards she was found resting on a mat of silk about the size and shape of a finished trap-door, but with no adobe to give it body it could serve only as a couch.

Truly are these spiders ladies in the dark. They rarely appear except at night and their homes are never lighted. Only by studying a nest in cross-section, as one can do of our exhibits at the Park, and noting the activities of the owner inside, can one gain an adequate conception of the obscure wisdom of these creatures.

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A female Trap-door spider will resist strenuously any attempt to raise the lid of her home. With a platform scale resting on a board, a slim stick, some string and a fishhook we measured the resistance and found it averaged 38 times the weight of the spider. Each trap-door was numbered and the pull exerted by each female spider was carefully measured and recorded.

BIRD DISPLAY

By EDWARD A. ARMSTRONG



FROM EARLY TIMES the strange posturings of birds have attracted attention. The domestication of the peacock, for example, dates from a remote age and its association with Hera or Juno shows that although it is an Indian bird it attained prominence in ancient Greece. There can be no doubt that the interest which it aroused was due not only to the magnificence of its plumes but to the remarkable way in which they are displayed. Shakespeare speaks of how the peacock will "sweep along his tail" (1 *Henry VI*, III.iii.6) and make "a stride and a stand" (*Troilus and Cressida*, III.iii.252). The Latin novelist Petronius in the first century and Dante in the thirteenth refer to the strange "klappering" performance of the stork. But it is only in quite recent times, with the development of a sympathetic and enlightened interest in the behavior of birds, that the various forms of bird display have been described accurately or studied scientifically.

The essential characteristic of display which

distinguishes it from other types of behavior is that it is meaningful to other birds—a sign language or code of signalling. By means of its displays a bird is able to evoke various kinds of responsive behavior from other birds. Granted that most birds have a considerable repertoire of calls and many sing elaborate songs which may be uttered in conjunction with, or as part of, the display, yet it is often the case that when birds have something to express they "say it with feathers." By exhibiting their adornments in a specific way or performing a set pattern of movements they induce a companion or enemy to respond in a particular manner.

An important category of display is that used between the sexes and commonly referred to as "courtship." Unfortunately, although this term describes some types of display fairly accurately it is not very suitable for general use. There is the danger that it may convey the impression that the feelings of amorous birds resemble those of



love-sick human beings. In fact we know very little about the nature of birds' feelings and are not justified in supposing there is any close resemblance between their states of feeling and ours. There is another reason why "courtship" is often inappropriate to describe display between the sexes amongst birds. In many species there is a great deal of posturing after pairing-up has taken place. For instance, gannets perform an elaborate bowing ritual at the nest when their chick is well grown. In such cases we might speak of "connubial display" but this is one of the types of posturing which is best described by the scientific term "epigamic display," covering all the various forms of display between the sexes.

It should be remembered, however, that as with much human ritual, so a particular form of ceremony may have more than one kind of significance and be such as to awaken different kinds of response in different beholders. A vic-

tory parade in a conquered city impresses conquered and conquerors in opposite ways, just as, amongst primitive tribespeople, a war dance stirs the fighting blood of the participants and their friends but is more likely to make the blood of their enemies run cold. Thus the utterance or posturing of a bird may have one kind of effect on a male and another on a female, or call forth different responses from friend and enemy. This is vividly illustrated in the song of birds. An unattached female is attracted to a singing male, another male is repelled. I have known instances when a bird, after a singing contest with another, has retired from the scene, apparently without ever having caught a glimpse of his adversary. So with bird posturing; in some cases a male uses his threat (or "aposematic") display to any other bird approaching with the apparent intention of entering his territory. Thus a snow bunting menaces any intruder but if it does not return his menacing demonstration or flee and just potters around — thereby indicating that it is a female — he gives an invitatory display in which the black-and-white pattern of his wings is much in evidence. Here we see that the display serves two purposes: it is a means of recognition and a device for warning off intruders. In a number of species if a male bird does not respond to the threat display with a similar display, it is dominated and treated as a female.

Like other animals, birds come into breeding condition as a result of physiological processes, especially the activity of the endocrine glands, but male and female must synchronize their sexual cycles if reproduction is to be successfully achieved. It is by means of display that, in many species, the fine adjustment is accomplished. Thus a great deal of epigamic display not only reveals to the female the sexual maturity of the male but also tends to stimulate her. Often she seems to pay little or no attention to the persevering and prolonged efforts of her suitor but there is plenty of evidence to show that she is not as careless as she appears to be. We see him:

Endeav'ring by a thousand tricks to catch
The cunning, conscious, half-averted glance
Of his regardless charmer,

who, perhaps, goes on feeding unconcernedly but does not leave the vicinity as she might so easily do if his efforts meant nothing to her.

It is now known that the sight of another bird

engaged in some activity may alter the behavior of the bird perceiving it to an astonishing extent; and if this is so, even between birds of differing species, as is known to be the case, much more species may stimulate each other psychologically. One example will show how the behavior of birds may affect their companions. Some geese were kept in a park which offered few nesting sites of the kind normally used by these birds. One of them, a gray lag which bred regularly, laid in a bare earth scrape, so the owner provided a heap of moss and pine needles which the goose soon shaped into a nest. A barnacle goose which had never bred took possession of the nest and laid an egg in it. The owner of the geese then supplied some more artificial nests with the result that fifteen of them were occupied by geese of various species and in eight of them eggs were laid and incubated. The experiment was repeated the next year and Egyptian and pink-footed geese were amongst the species which bred. Evidently the sight of the nests and birds busy with nesting activities caused a change in the psychology of the geese. Even immature birds were stimulated. Two other instances will show how potent are these psychological stimuli. It has been observed that an isolated female pigeon will not lay, but if she is given a female companion both may produce eggs. If a female pigeon in her cage is placed where she can see a displaying male, ovulation may be induced. Thus there is no doubt that display causes sexual stimulation and enables birds to synchronize their sexual rhythms.

The procedure in regard to pairing-up characteristic of many passerine birds is well known. Shortly after the male arrives and takes possession of a territory a female appears, attracted by his song, and after a certain amount of display, varying according to species and circumstances, the birds pair-up. Many species, however, diverge more or less from this pattern of behavior. Most gulls and terns breed in colonies where they defend their nest sites with great vehemence, but many of them indulge in a certain amount of communal display and they cooperate to the extent of combining forces to mob an enemy. Any naturalist who observes gulls attentively for some time will notice that sometimes one or two birds, beginning to perform some activity such as preen-

ing, displaying or calling, are copied by others around them so that soon nearly all the members of the flock are acting in the same way. This kind of behavior is described as "social facilitation" and such contagiousness of activity not only contributes to the integration of the community but is probably a means whereby the synchronization of activities within the colony is achieved. In many species which nest colonially, such as gulls, terns, penguins and ibises, it has been observed that there is a tendency for the birds in particular groups to be at approximately the same stage in the nesting cycle within the group, while other groups in similar environments not far away are at a different stage. Thus social facilitation appears to contribute to social stimulation. There is even some evidence that a certain amount of bickering amongst birds may be advantageous in stimulating the birds sexually.

On this basis it is easier to understand the biological advantages of arena or "lek" display. Such birds as the blackcock and ruff in Europe and the prairie chicken and sage grouse in the United States do not establish nesting territories but meet together at a traditional displaying ground where the males posture and feint at one another and are visited by the females. Those which signify their willingness are fertilized and go elsewhere in the neighborhood to lay and incubate. Thus in these species territory has shrunk so that it is in some cases, as in the ruff, only a foot or two across and its function in providing a site for the nest has disappeared. It is a stance for display, and in a number of such species, also the nuptial bed. Most of the posturing is threat display but it is seldom that any serious fighting takes place. Desperate fighting is rather uncommon amongst birds, for they usually content themselves with psychological warfare. Many species have formalised or ritualised fighting so that it is more a matter of talking or looking big — of uttering defiant calls or giving threat display — than an exchange of blows. When fighting does occur amongst heavily armed birds, such as gannets, they do not use their beaks in the most effective way as spears or daggers but grapple each others' mandibles. Birds, not men, have succeeded in "humanizing" warfare.

Gannets are amongst the many colonially nesting birds which defend only the site of the nest

and perhaps a small area around it. In some such species the territory is almost as small an area as the display territory of the ruff but obviously the function it serves is different.

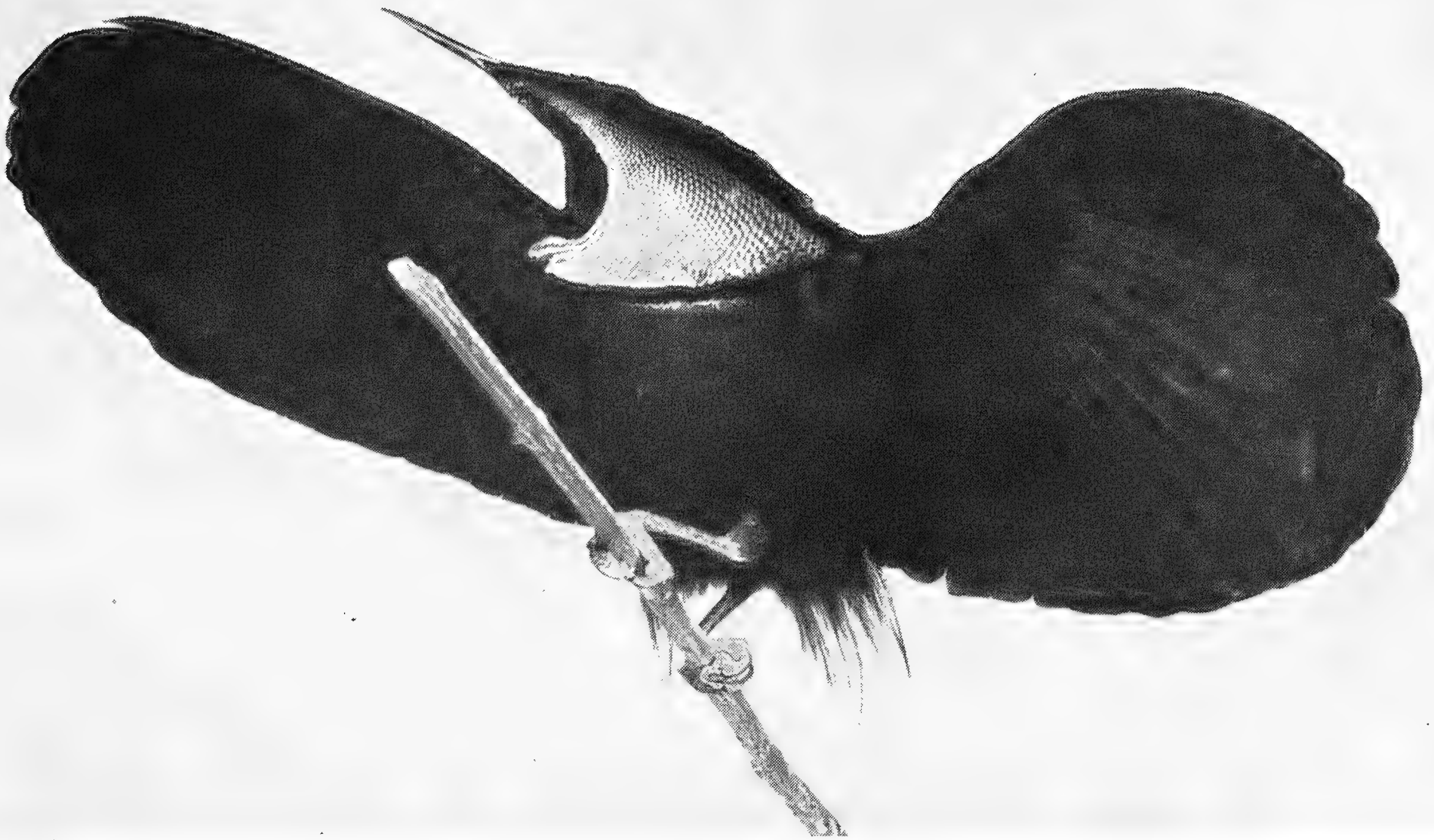
One aspect of the ritualisation of behavior which is so common a feature of bird life is the fact that most fighting and display-fighting is in connection with territory and does not consist of duels for a mate. It is obvious that if there were indiscriminate fighting for the females there would be a great deal of confusion, numbers of birds would be injured and a great deal of time would be wasted. Such a state of affairs would be disastrous, as few birds could initiate and conduct breeding activities undisturbed. Even when territory is a mere stance for display and the birds spend hours a day, for months at a time, making threatening gestures at one another, as is the case with the ruff, the impulse to keep out of one another's territory is so strong that after a little sparring the birds retire again to their own strongholds without doing each other much damage.

The situation is rather like that amongst various primitive tribes. The warriors dress up in fantastic adornments, often, indeed, using the plumes of birds to augment the effect, and dance with great vigor, but in the subsequent skirmishes not many men are killed.

Ducks of various species are amongst the comparatively few birds in which open competition for the females without the mitigating influence of territorial compunction appears to take place. Canvasback drakes swim about in parties near a female, displaying vigorously, and eventually she pairs-up with one of them. Only after the pair has been formed do the birds establish a territory — which has the function of enabling the ducks to mate without interference from their fellows. The European pochard pairs-up in a somewhat similar way and probably the red-breasted merganser's courtship is of the same type. In these birds we find the ritualisation of fighting carried to the point where, although the drakes will make intimidatory gestures at one another over a long

Technically, the mutual display of these Cooi Herons is believed to be a means for establishing dominance of the male. Artistically, this is one of the very finest examples of the photographic skill of the late Elwin R. Sanborn.





The very rapid opening and closing of the wings, combined with the pendulum-like movements of the brilliant, iridescent green breast-plate, make the display of the Magnificent Rifle-bird one of the most fascinating to be seen among the many species of these Birds of Paradise.

period while trying to win the duck, they seldom or never come to blows. Again we note the difficulty of giving an exact definition to certain displays because of their double or multiple significance. It is probable that the aposematic displays of the drakes stimulate the duck sexually and it is possible that her choice of a drake may be influenced by the vigor of his threat display. Similarly the display of the oystercatcher, in which several birds gather and pipe against each other like rival bagpipers, seems to be a mingling of threat and sexual display. As with arena-displaying birds, ducks of many species exhibit striking adornments, such as the red mouth and crest of the red-breasted merganser. It seems that in species in which the pair-bond is feeble there is a tendency to develop remarkable adornments. The ruff wears a neck-frill from which it derives its name, the blackcock a striking tail and the greater bird of paradise an amazing array of plumes. There may be biological advantage in the males being easily identifiable by the females during the brief period when they are associated, as their distinctiveness tends to prevent hybridization. There is much more danger of mistaken

pairing taking place and hybrids being produced in species in which the pair-bond is loose than in species in which male and female are more faithful to one another, and amongst arena-frequenting birds it is usually the case that after the female has been fertilized at or near the display-ground the association comes to an end.

Amongst the various types of bird display there is one of very different character from the behavior we have been discussing. Every naturalist has observed birds which, when startled from the nest or alarmed while accompanying their chicks, acted as if they had to greater or lesser extent lost the use of their wings or legs. This behavior is often called "injury-feigning" or "the broken-wing trick" but should be considered a form of distraction display. Many instances have been recorded of birds thus decoying predators away from the nest or young and it is a common idea that such behavior is a demonstration of "intelligence." It is much more probable that its origin is in a lack of coordination between the bird's impulses. Often it would seem to be a kind of compromise between the impulse to

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A Departure From Tradition—and the Reason

By DONALD T. CARLISLE

YOUR SOCIETY has been endeavoring since the war to make its work more interesting and more valuable to the membership. If the recent increase in members means what we hope it does we have in part succeeded, for about the time this issue of *Animal Kingdom* reaches you we should have over four times as many members as we had three years ago.

One of our policies—and we think it's a good one—has been to keep our members in frequent touch with the Society's work. We have had previews of special events, such as the arrival of the young Congo elephants and the Duck-billed Platypuses. We have reinstated guided tours of the Park. We have encouraged other organizations and societies to hold outings there. We have endeavored to increase the value of this magazine. We are this spring instituting a series of *Expedition Newsletters* that will carry our members vicariously to the Congo, to South America and to our own Jackson Hole Wildlife Park. We have done a number of other things to keep our members aware that the New York Zoological Society is hull-down on a long and "forever new" trail that it will be well worth their while to follow.

As we come on into another year it has seemed advisable to take a sounding. All these membership services cost money and this expense like the costs of everything else is up a good bit over prices a few years ago. It is fair we feel sure you will agree—in fact we believe most members would prefer—that some part of membership fees shall go to the support of the Society's work; that not *all* of their \$10.00 annual dues shall be returned to them in services. We are happy to report that the sharpest pencils on our staff figure that there is still a slight margin between static membership dues and rising printing and other costs. However, a little more of this inflationary trend and our margin would be wiped out.

Hence we are presented with a problem: shall we reduce our program or cheapen it? Or shall we increase membership fees? Neither of these

choices is a happy one. On the one hand our members have come to us because of the interest created by our activities as they have been reported. On the other a ten-dollar annual fee is traditional with us and it strikes us as being the proper minimum amount.

There are other possible alternatives. We know for example that if our present membership of about 4,000 is doubled again the total service cost per member is reduced and our margin of "black ink" is protected or perhaps somewhat bettered—for many of our larger cost items remain about the same whether we have four or forty thousand members. This means that we and our membership must drive ahead for many new members.

Another avenue opens up to us too. We are fortunate indeed in the fact that among our friends we have so many who would be glad to do a little bit more for the Society if they knew how helpful it would be. These are civic-minded people who are in the happy habit of contributing regularly to education, to science, medicine and social enterprises. A number of them tell us that they would like to give the Society more support. Others simply send in checks time to time.

We have therefore concluded to depart from tradition. For over fifty years we have had a \$10 annual and a \$200 life membership. Now we are about to institute two new membership classes.

The first is a Contributing Membership at \$25 a year. This fee we are advised is deductible in figuring income tax just as is our \$200 Life membership fee. For many of our members \$25 a year is no more onerous than \$10, and these extra dollars would be extremely helpful.

Our other new membership class is that for schools. For the first time the Society will seek memberships in the names of other than individuals. The great increase in school interest in the zoo and the Society's work has led us to inaugurate what we believe can be made a most valuable educational project. We expect to work out with the schools themselves a program that will be of

first importance in the teaching of science and conservation. This School Membership will also carry a \$25 annual fee.

There are over two hundred independent schools in and around New York that should find great value in this association with the Society. Perhaps you are a trustee of one or more of them. Possibly you have a son or a grandson, a daughter or a favorite nephew or niece in some school that you think is doing a sound teaching job. Perhaps you would like to take out a membership for some such school.

Those who heard President Osborn's speech at the Annual Meetings seemed pleased with

the fact that the Society is operating on an extremely well-balanced budget. Your staff intends to keep it so. This means our doing what the cattlemen call "riding the fences" to see that there are no leaks. When you get your next little bill for annual dues you will find a slip with it asking you to consider transferring to a Contributing Membership. We hope you will feel able to do so. It would help tremendously in the maintaining of our well-balanced budget—and it would mean that our standard of service can be kept on its present or even a higher level.

We estimate that fully a third of our members could make this transfer without "feeling it."

New Members of the New York Zoological Society

Founder

Howard Phipps

Associate Founder

C. Suydam Cutting

Fellow

Dr. William H. Phelps

Life

Mrs. Frederick Godfrey Bird

Mrs. Richard De W. Brixey

E. Hubert Litchfield

Miss Toni Sandor

Contributing

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Hawley T. Chester

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Rowland R. Hughes

William E. Hutton

Charles Paul

Miss Jane M. Perkins

Mr. & Mrs. Thomas Harris Powers

Alfred L. Rose

H. Boardman Spalding

William Zietz

Coleman duPont Donaldson

William A. Rockefeller

School

Portsmouth Priory

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St. George Biddle Duke

Mrs. Donald Durant

Master John O. Ellsworth

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Malcolm G. Field

W. Allston Flagg

Sterling deG. Foote

Gordon C. Forbes, Jr.

Sumner Ford

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Isadore Freid

Mrs. Frederick W. Garnjost

Mrs. Natalie Gates

Julius Gerber

William J. Gessing, Jr.

Herman Getz

Gus Goldberg

Dr. L. W. Goodman

Emmanuel Gran

Henry Lindsay Gresham

Fred Hahn

Miss Bette B. Hammer

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Mrs. Harriet King Hendrick

Richard C. Hollyday, Jr.

Mrs. E. W. Holmquist

Mrs. Giddings Howd

Bernie Hunter

Harold M. Iseman

John G. Ivan

Melvin H. Jackson

Dr. Abraham Jezer

Murray F. Johnson

Miss Patricia Jones

Mrs. Kurt Kasznar

Charles Kennedy

Le Roy Kent

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Miss Myra Kingsley

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 J. Townsend Russell
 Mrs. Emma M. Saar
 Teviah Sachs
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 Otto Wierum
 Dr. Benjamin Wiesel
 Mrs. Gordon E. Wightman
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 Edward A. Williams, Jr.
 Abraham R. Winer
 Mrs. Faith W. Wing
 Charles G. Witherspoon
 Jacques Wolfgang
 Benjamin F. Young
 Mrs. Roger A. Young

BIRD DISPLAY

(continued from page 56)

tend the young and the urge to escape from danger. As distraction display of this kind is likely to facilitate the survival of the next generation, it seems that natural selection has not eliminated it, but rather, in some species, furthered the evolution of uncoordinated movements into a performance which resembles the distracted sprawling of a wounded bird.

It will be apparent that the study of the display of birds is not only a delightful pastime in which a wealth of fascinating beauty of movement, sound and form is revealed but that it contributes to the solution of some of the most interesting and elusive problems of biology and psychology. No other creatures equal birds in the vividness with which they disclose in their behavior their mental states and nervous reac-

tions, and, as in studying the psychology of animals we are almost exclusively restricted to the interpretation of behavior, the study of bird display provides information contributing to the understanding of the nature of the emotions and instincts of creatures lower in the scale of life than ourselves. The study of display also contributes to another aspect of science — the classification of the Animal Kingdom. Increasingly those concerned with the classification of birds study their behavior as well as their structure and in not a few instances it has been found that posturings provide clues, which, when taken in conjunction with other evidence, make it possible to arrange the birds in a more correct zoological relationship than could be achieved when only structural factors were taken into account.

NOTES ON THE SOCIETY'S CURRENT WORK IN CONSERVATION, RESEARCH AND EDUCATION

Animal Behaviorists Meet

The Committee for the Study of Animal Societies under Natural Conditions held a meeting, sponsored by the New York Zoological Society, on the last two days of January at the Zoological Park and University Club. Scientists prominent in the fields of comparative psychology, mammalogy and ecology attended, among them:—

Professor F. A. Beach, Yale University

Professor C. R. Carpenter, Pennsylvania State University

Professor W. W. Chase, Michigan University

Mr. H. J. Coolidge, Pacific Science Board

Professor R. H. Denniston, University of Wyoming

Professor J. T. Emlen, University of Wisconsin

Professor R. K. Enders, Swarthmore College

Professor B. F. Riess, Hunter College

Dr. J. P. Scott, Roscoe B. Jackson Memorial Laboratory

Mr. J. R. Simon, Jackson Hole Wildlife Park.

One of the functions of the Committee is to organize and supervise the research program at

the Jackson Hole Wildlife Park. This program, which is being carried out under the auspices of the Society, was started last summer and included such diverse subjects as the physiology of small mammals in relation to altitude and behavior, population analyses of birds, the ecology and behavior of elk, moose and sage grouse, the blood groupings of nearby Indian tribes and a botanical survey. All these studies are either essential preliminaries to or directly bear upon the basic problem of social behavior of animals, including man, under natural conditions. After reviewing last summer's work, future researches and policies were discussed and outlined. It was pointed out that Jackson Hole, Wyoming, is unique in the completeness of its fauna, up to and including the large game animals, and in its freedom from introduced species, both terrestrial and aquatic. It was also agreed that the place could offer most excellent opportunities and facilities for the training of potential conservation workers and officials.

Cooperating With The U. N.

The active planning stage of a world survey on the incidence of soil erosion has been initiated by the Society's Conservation Division in collaboration with the Food and Agricultural Organization of the United Nations. The purpose of this survey is to make known to government officials of the various nations the danger spots on the earth's surface where affirmative action to protect the living earth is imperative.

At the invitation of the Economic and Social Council of the United Nations the Conservation Division is participating in the preparation of the agenda for the world conference on natural resources to be held in the spring of 1949. Scientists and technicians from the several nations will discuss at this conference the significance of the interrelations of the world's life-supporting resources to each other and to human health and economic security.

Four Expeditions In The Field

The New York Zoological Society has at present *four* expeditions in the field—in southern United States and in four foreign countries—that are collecting specimens and data both for exhibits at the Park and scientific research.

The first of William Bridges' Newsletters telling about the Belgian Congo Expedition, have already been received by members. Professor Alfred E. Emerson of the University of Chicago and the Society's Scientific Advisory Council is now en route to join Cordier and Editor Bridges and then to undertake studies on the numerous termites of the region. Dr. Emerson is internationally famous for his analyses of the complex societies in which these insects live. He made some of his early termite observations in British Guiana at the Society's renowned jungle station in Kartabo under the direction of Dr. William Beebe. The possibilities of establishing a similar scientific outpost in the Congo will be examined by Dr. Emerson during his sojourn there.

The Forty-seventh Expedition of the Department of Tropical Research is also well underway. Dr. William Beebe, its leader, and Entomologist Henry Fleming sailed for La Guaira, Venezuela at the end of January. They have again established headquarters at Rancho Grande and will observe and record the various migrations of thousands of birds and millions of butterflies that occur in the area. Special trips into the llanos and mountains of the surrounding regions will be made to study waterhole ecology and that strange, reptile-like bird, the Howatzin. Meanwhile, Miss Jocelyn Crane has been exploring general biological conditions on the island of Tobago with special emphasis on the breeding and courtship of spiders and birds-of-paradise (introduced from the East).

In order to obtain new genetic strains of fishes and to replenish old ones for the New York Aquarium's Genetics Laboratory, an expedition to southern Mexico has been organized. Geneticist Myron Gordon is leading it, accompanied by the Aquarium's Assistant Curator, Mr. Atz, and Mr. F. G. Wood of Yale University. They left New York on February seventeenth bound for Vera Cruz, Oaxaca and Tabasco, where they will collect platyfishes and swordtails for shipment back to the laboratory. At least two of the rivers they intend to fish have never been touched by ichthyologists and others on their itinerary are barely known. By crossing various geographical strains of these fishes Dr. Gordon can develop individuals with pigmented growths, called melanomas, useful in cancer research.

Curator Eddy and Photographer Dunton are "expeditioning" in South Carolina, collecting, studying and photographing reptiles, amphibians and invertebrates. Particular attention is being paid to the feeding habits of snakes recently emerged from hibernation and to the habits of the eastern trap-door spider, the ant-lion and the bombardier beetle.

President Osborn Receives Honors

Our Society's president, Fairfield Osborn recently accepted the invitation of the Secretary Krug of the U. S. Department of the Interior to serve on an advisory committee composed of representatives from American Conservation organizations. This committee will collaborate with the Department of the Interior on all conservation matters coming within the Department's scope.

Mr. Osborn has also been elected an honorary vice-president of the American Forestry Association. He addressed the 13th North American Wildlife Conference at its annual convention in St. Louis last March 8th, 9th and 10th.

Conservation Education

"The Living Earth Series," a group of four motion pictures in color, presenting the fundamental problems and principles involved in the conservation of the soil and of life that is directly or indirectly dependent on it, is being completed by the Conservation Division of the Society. These films will be distributed to school systems in the United States and abroad by Encyclopaedia Films, Inc. They are entitled:—

The Birth of the Soil
This Vital Earth
Arteries of Life
Seeds of Destruction

The Division also prepared a demonstration for the conservation exhibit of the Garden Club of America at the New York Flower Show, which opened at Grand Central Palace on March 8. It consisted of a landscape in diorama that, by means of a fading mechanism, changes continually from a rolling countryside, prosperous under good farming methods and land management to that same locale as it might appear with its fertility mined, its woods cut down and its farm abandoned in despair.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

A Letter To The President

Dear Mr. Osborn:

I have to thank you for having given me the opportunity of reading your very interesting book. I airmailed a few words to Little, Brown last Tuesday, and hope that they will have got them in time. The great question now is: will the public and those in authority pay any attention to what you say, or will the politicians go on with their lunatic game of power politics, ignoring the fact that the world they are squabbling over will very shortly cease to exist in its old familiar form, but will be transformed, unless they mobilize all available intelligence and all available good will, into one huge dust bowl inhabited by creatures whom progressive hunger will make more and more sub-human? I have been trying to put this question to the general and specialized publics for the last year or two—even succeeding in planting it in the Bulletin of the Atomic Scientists this summer, pointing out that, while mankind could do very well without atomic energy, it cannot dispense with bread. But hitherto I have had no audible response from any quarter. I hope very much that you, with your scientific authority and your beautifully organized collection of facts, will be able to make some impression in influential quarters. But, alas, in view of what politicians and the voting public are like, hope must always be mingled with a great deal of doubt.

My own interests in recent years have turned increasingly in the direction of philosophy and mystical religion, and I see this problem of Man's relation to Nature as not only an immediate practical problem, but also as a problem in ethics and religion. It is significant that neither Christianity nor Judaism has ever thought of Nature as having rights in relation to man, or as being in some way intrinsically divine. You will find orthodox

man has done by them. It seems to me that, if Catholic moralists ascertain (on the basis of those extremely unfortunate remarks in Genesis) that animals may be treated as things. (As though things didn't deserve to be treated ethically!) The vulgar boast of the modern technologist to the effect that man has conquered Nature has roots in the Western religious tradition, which affirms that God installed man as the boss, to whom nature was to bring tribute. The Greeks know better than the Jews and Christians. They know that hubris towards Nature was as much of a sin as hubris towards fellow men. Xerxes is punished, not only for having attacked the Greeks, but also for having outraged Nature in the affair of bridging the Hellespont. But for an ethical system that includes animate and inanimate Nature as well as man, one must go to Chinese Taoism, with its concept of an Order of Things, whose state of wu-wei, or balance, must be preserved; of an indwelling Logos or Tao, which is imminent on every level of existence from the physical, through the physiological, up to the mental and the spiritual. In many passages, particularly of the Specimen Days in America, Whitman comes very close to the Taoist position. And because of Whitman and Wordsworth and the other "Nature mystics" of the West, I feel that it might not be too difficult for modern Europeans and Americans to accept some kind of Taoist philosophy of life, with an ethical system comprehensive enough to take in Nature as well as man. People have got to understand that the commandment, "Do unto others as you would that they should do unto you" applies to animals, plants and things, as well as to people; and that if it is regarded as applying only to people (as it has been in the Christian West), then the animals, plants and things will,



Territorial Administrator Photo

William Bridges is, for the present, stationed in Mangandu, forty miles from this pictured Administrative Post at Lubutu. This comfortable example of civilization is like a small oasis. A few steps outside of this Post's area would bring you into true wilds of the Belgian Congo.

in one way or another, do as badly by man as we are to have a better policy towards Nature, we must also have a better philosophy.

Yours very sincerely,

ALDOUS HUXLEY

A Herald-Tribune Man Eats His Words

Newsmen traditionally shy away from scientific terms in their copy—not because they write down to their readers, but for the very good reason that somewhere between the City Desk and the presses, Latin names and other technicalities have a way of getting garbled, which slows things up or brings in complaining letters to the editor.

But Tex O'Reilly of the Herald-Tribune yielded to temptation. An old friend of the Society and the Zoo, Tex covered our annual

meeting at the Waldorf last January 19th. Fresh from five years in Europe as war and “recovery” correspondent, Tex was confronted with an array of mammals, birds, reptiles, insects and fishes, all being referred to familiarly by Messrs. Crandall, Coates, Eddy et al under their scientific nomenclature. It was too much for Tex. He pulled out all the stops in his story which is reproduced here just as it appeared in next morning's paper:—

Teleonema filicauda, (the sharp-tailed manakin from Peru), *Dendrobates tinctorius*, (the poisonous frog from South America) and *Mollienisia latipinna*, (the common mud pusser), moved into the Waldorf-Astoria yesterday afternoon. They were followed quickly by squads of learned curators and scientists. Then came 1,200 men and women who settled themselves into chairs in the grand ballroom of the hotel. The fifty-second annual meeting of the New York Zoological Society was under way.

But this was only the half of it. So great has the influence of the society become that it cannot confine its annual meeting to a one-night stand in the vast ballroom. The entire meeting will be repeated again tonight without so much as a single *Chlorophonia cyanea frontalis*, (yellow-fronted green tanager from Venezuela), left out and 1,200 more members will be on hand to "see the elephant and hear the owl," (*In modo loquendi*).

Members of other organizations meeting at the Waldorf were somewhat at a loss to comprehend what was going on when workmen began carting in such things as *Kitia chinensis chinensis* (the hunting crow from Burma). The Compressed Gas Manufacturer's Association, which was meeting next door and which was engrossed in reports of the methyl chloride committee and the anhydrous ammonia committee, became a bit nervous when wild screams sounded from the next hall. Little did they know that it was only Lee S. Crandall, general curator of the zoo, installing *Lagothrix*, the South American woolly monkey in an exhibition cage, with the latter protesting.

\$160,120 in Gifts

But heads of business organizations who were members of the society listened with envy when Fairfield Osborn, president of the Zoological Society, stood up before the huge assemblage to give his annual report. Even the exhibits in the outer room seemed to lapse into respectful quiet when he said: "For the sixth consecutive year the society operated within its earned income and without the shadow of a deficit. Gifts and legacies totaled \$160,120 and none of these funds needed to be used as oxygen-tent money; every penny of them can be used for new and creative work of the society."

Then Mr. Osborn proceeded to describe some of the important scientific work of the society during the last year. He told of grants of \$15,068 from the National Advisory Cancer Council to further the society's cancer research, \$1,250 from the American Cancer Society for the same purpose and \$1,000 from the Rockefeller Foundation to enable the society to make a preliminary survey leading to a long-term psychological study of animals.

Fantastic New Arrivals

It also was reported that during the last year the society exhibited more rare animals than it had in any one year of its existence. Photographic records of these fantastic arrivals were shown. They included the duck-billed platypuses, or three dreams walking; the echidna, living pin-cushion; tree shrew (untamed); vampire bats (ugh!); slender loris, or nightmare on the loose; lion marmoset (monkey of the year), and *Tarsius*, an old relative of man who still hangs around this worried world.

After the report of the president and the motion pictures showing the society's numerous activities the 1,200 members went out and once more admired the living exhibits, including *Hyphessobrycon innesi* (the tetra fish which glows like a neon sign in front of a bowling alley).

The entire meeting will be repeated tonight, but this is the only story which the New York Herald Tribune will publish about it.

"If this gets by I'll eat it," said O'Reilly, audibly enough to reach the ears of the Man on the

Desk by a route unspecified. Next evening when Tex and the boys gathered at Blake's Tavern, rendezvous of Herald-Tribune folks, there at Tex's place was the story resting on a lovely blue-plate surrounded by catsup, crackers and a pitcher of water.

Tex says he gave a preliminary gulp, and was about to fulfill his pledge when somehow it was managed that he was called away. When he returned the story had been shredded and adroitly blended with a bowl of chef's salad or some such delicacy. Consumption was thus made a bit easier, and he cleaned his plate.

When we asked O'Reilly if he found it difficult to eat his own words, he said: "I don't advise it as a regular diet. You chew and you chew and they're still there."

A Fish Story

When the old New York Aquarium closed down in 1941, only a selection of its smaller fishes could be carried up to the Lion House in the Zoological Park from the Battery. The remainder of the collection, comprising many of the medium-sized and all of the large specimens, was either liberated or donated to the public aquariums of Bermuda, Boston, Philadelphia and Washington, D. C.

Among the specimens received by the Fairmount Park Aquarium of Philadelphia was a Giant Grouper, *Promicrops itaiara*, weighing in the neighborhood of 200 pounds. This fish had been captured at Key West, Florida in the summer of 1937 and had grown slowly but steadily during the four years it lived in one of our largest tanks. In order to restrain this powerful specimen during the hundred-mile trip by truck it was laced up in a canvas corset, leaving only its head and gill covers exposed. It was then suspended by ropes in a canvas cradle filled with sea water that was constantly aerated.

From Philadelphia, Superintendent Harry R. Lindaman writes us that this Grouper is still alive, and that since the twenty-sixth of September, 1941—when it slid out of its corset into its new tank with scarcely a ripple and peacefully took up its new life with nine other smaller specimens of its own kind—it has thrived and gives every promise of continuing to do so.

JAMES W. ATZ

A Little Chance

TO HELP A LOT

Our privilege costs are rising. We do not wish to reduce nor cheapen privileges. Neither do we wish to increase the cost of annual membership. So many young student and scientist members cannot afford to pay more.

We know you want to help the Society; want a share of your fees to stand as a contribution towards the Society's work. Yet a little more inflation will wipe out the difference between static fees and rising privilege costs.

Our new CONTRIBUTING MEMBERSHIP at \$25 a year will help a lot towards solving this problem if enough generous members will transfer to this class. We are advised that this fee is deductible in figuring income tax.

A few hundred CONTRIBUTING MEMBERS will allow us to maintain and improve Society privileges without disturbing the present membership fee structure.

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NEW YORK ZOOLOGICAL SOCIETY



ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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We Must Think More Broadly About Animal Life

This is an excerpt from a talk that President Osborn gave before the 13th North American Wildlife Conference at St. Louis on March 10. It drew a prolonged ovation, reflecting the inherent appeal of an idealistic approach to the problem of wild life conservation. — Ed.

I AM WONDERING whether we should not extend our thinking concerning animal life into its entire range rather than talking and thinking solely of wildlife, which connotes primarily game animals, water fowl and fishes at the far end of a rifle, a shot-gun or a fishing line. I am not unmindful of the fact that the interest and backing of sportsmen is an invaluable and vital element in the conservation movement. Even then would we not do better to think of wild animal life in its complete range — mammals, birds, reptiles, fishes, beneficent insects, down even to the protozoa that help make the living fertile soil. We would be resting our cause on a firmer foundation. We would be supported by the irrefutable principles of ecology, or, more simply, the inter-relatedness of all living things.

If I may go a step further, I do not think we would make any error in stressing ethical values which some Philistines might dismiss as an emotional appeal but which I claim is a recognition of the truth that other living things also have a right to existence. Unfortunately, as the brilliant observer of human life, Aldous Huxley, pointed out to me in a letter recently, Christianity, expressive of the ideals of Western civilization, generally adapts the Golden Rule

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How the Congo Peacock Was Discovered

By JAMES P. CHAPIN

American Museum of Natural History

THE NEWS that my friends Cordier and Bridges already have several live Congo Peacocks gives no one such joy as it gives me. For years I have waited to get a better look at the bird whose existence I long hesitated to affirm, yet which I finally hunted myself in the heavy shade of an equatorial forest. Now I am confident that we

shall study it at our leisure, and very probably it can be bred here.

In the year of grace 1909 the Belgian steamer *Leopoldville* was plowing her way from Antwerp to the Belgian Congo, which less than a year before had been the Congo Free State. One very young passenger was talking with an old-timer of that Congo State. "So you are going out to study birds," inquired Monsieur Rieux. "Do you know the most beautiful bird in the Congo?" It was, he explained, the "foliotocol," the Emerald Cuckoo. I was that other passenger.

My acquaintance with the Emerald Cuckoo then amounted to one inspection of a very old mounted specimen in the American Museum of Natural History. I had marveled at its jewel-like green feathers, had probably wiped a little dust off its glass eyes, and set it back in its appointed place in an exhibition case. Before another year had passed I was much more familiar with that gem of the Congo forest than Monsieur Rieux and all the other passengers on the SS. *Leopoldville*. Not one of them, moreover, had a word to say about a large game-bird that roamed the forests of the Upper Congo, handsome of dress, still awaiting discovery by some fortunate naturalist. It was yet to elude us all for twenty-seven years, and that is the story I am so often asked to tell.

An equatorial forest guards many secrets. It displays a profusion of birds, even to the casual traveler; but one may always be sure that hiding away under its cover are certain species far from



LEOYD
SANDFORD

easy to find or to study. The people in closest contact with them are little concerned unless the bird be useful as food or harmful to their economy. Often they speak no language of the outer world, and to learn the names they apply to various birds is an arduous task. In the many dictionaries of African tribal tongues one finds relatively few names for birds, fewer exact definitions, unless the compiler was an ornithologist as well as a linguist. For a traveler the most useful language is a trade-dialect like the Lingala of the Congo River, and that offers the barest minimum of bird names.

An ornithologist must therefore make a collection, as varied as possible; and only then by showing the specimens to natives can he obtain a fair list of words used to designate birds in the real tribal languages. In making a collection it is not enough merely to shoot what is seen. Many another clue may offer itself, a distant call, a track in the mud, or a feather on a man's hat.

When my first volume on Congo birds appeared in 1932 it included the family Phasianidae, represented in Africa by many species of francolin and several kinds of partridge and quail. But there was no mention of any true pheasant, as the more brightly colored members of the family are called, or of any peacock. Africa was still believed to have no native species of pheasant, and the peacocks are simply large pheasants with most wonderful plumage.

With a little more luck, by that time, I should have known better. Ever since 1913 I had been preserving carefully a curious wing-quill that I could not identify. It came from the hat of some unknown man at Avakubi in the Ituri forest, and was one of a varied assortment of feathers I had gathered there. Gradually I had been able to match them—all save this one. It had a strong, curved shaft, and suggested a flight-feather from the forearm of some galline bird. Too big for any francolin, it was rufous barred with black. At one time during the early 1920's I all but decided it must come from some large game-bird as yet unknown to science. Then my courage failed me; there could be no such bird in the Congo, or in all Africa!

Only since 1936 have I known the species my feather came from. In the early years of this century, I then learned, two large birds had been

mounted by a Brussels taxidermist to be placed in a show-case amid a collection of some sixty specimens in the home office of the Kasai Company. That was one of the important concessionary companies set up in the old Congo State; it controlled a vast area in the southern Congo, and all these birds appear to have been collected there by some unknown employee.

The only ornithologist, so far as I know, to examine the collection while it was in the Rue de Naples was Professor Alphonse Dubois of the Royal Museum in Brussels. He found what he believed to be a new species of woodpecker in it. Yet I hesitate to affirm that he was responsible for the labeling of two of the larger specimens as "*Pavo cristatus*." In 1914 the Kasai Company did a little housecleaning, and donated its collection of birds to the Congo Museum, now occupying a beautiful building in the Park of Tervueren. Those birds labeled as *Pavo cristatus*, or Indian Peacocks, aroused no enthusiasm, for there was an added notation that they were young, and imported. Instead of going into the exhibition hall, they were placed on top of a cabinet in a corridor on the top floor.

Seldom did any ornithologist pass that way. I made a half-dozen visits to Tervueren, and Doctor Schouteden, the Director, and I became warm friends before that summer day in 1936 when I went looking for him in a far corner of the top floor. Chance led me past those "peacocks," now standing alone in their corridor. One looked black, the other rufous with a shining green back. Out of one wing of the rufous bird stuck a large feather, barred with black. Here at last was my mystery bird! When lifted down, the black specimen was found to have much brilliant blue on its fore-neck, wing-coverts, and tail-tips. Its legs had large spurs; this could be no young peacock! A little study convinced me that they were adults, male and female, of a new pheasant genus from the Congo forest.

Doctor Schouteden, incredulous at first, proved his generosity by encouraging me to give the birds a scientific name. The relationship to the peacock genus *Pavo* was evident, despite the lack of any train or of eye-spots in the plumage. We still could only guess as to the part of the Congo from which they came, so the name bestowed on the new species in the autumn of 1936 was *Afro-*

In 1913 Dr. Chapin took the feather on the left from the head-dress of a native in the Ituri forest. It puzzled him until 1936 — and then he found a similar feather on a mounted specimen in Belgium (right). It was the bird now famous as the Congo Peacock!

Photo by the Author



pavo congensis, which later we translated as Congo Peacock, "le paon congolais."

The word peacock, suggested by the erroneous label, was retained for its publicity value. Doctor Schouteden was to publish a note in the *Bulletin* of the Congo Zoological Club, which circulated widely in the Belgian Congo. Thus we hoped to learn much more about this fabulous bird from residents in that country. Before long, indeed, our peacock was featured in the newspapers of London, Brussels, Berlin and New York. The first clue, however, came from a source that was totally unexpected.

Within about a week after I first saw *Afropavo*, the Cercle Gaulois, a famous club in Brussels, offered a luncheon of welcome to the new Minister of Japan, none other than Saburo Kurusu, whose name is now all too familiar in America. To that luncheon I was invited by

Mr. de Mathelin de Papigny, whom I first met in the Congo in 1911, and who was now a prominent figure in Belgian mining circles. I quickly lost interest in Kurusu, for de Mathelin began to ask me about a remarkable game-bird he had eaten just once, in 1930, at his gold mine at Angumu. His description tallied exactly with the male of *Afropavo*! Now I knew one place where the birds really lived. Angumu is in the heart of the forest, about 100 miles south of Avakubi. My old feather might well have come from that general direction.

A few months later, after the *Bulletin* had been read in the Congo, more news began to arrive. Mr. R. Geldof wrote Doctor Schouteden from Kindu that about six years before he had shot such a bird at 50 kilometers south of Stanleyville, that it had been mounted, and could now be seen in the home of his sister in Eecloo,



Photo by the Author

These four skins of Afropavo, the Congo Peacock, were awaiting Dr. Chapin when he reached the Congo in 1936 to track down the bird he had named. Dr. Dyleff secured them at Angumu.

Belgium. It proved to be a fine female specimen, and was donated to the Congo Museum.

Then came a letter from the Reverend H. Wilson at Inkongo, near Lusambo, in the very district where the Kasai Company's birds might well have been obtained. He recalled having skinned a Congo Peacock many years before, but could not say what had become of the specimen. Mr. Wilson does recall that he was so impressed by the bird as to use its native name, "Mbulu," to mean peacock when translating the Bible into the native language of the Bakuba.

Thus the vast area really inhabited by this most elusive bird began to take shape. Why had it not been discovered long ago? With Herbert Lang in 1909 I had traversed on foot one small corner of its forest home, between Stanleyville and Bafwasende. But we were in haste, I had barely begun to speak Kingwana, and we traveled with a large caravan of noisy porters.

At any rate, my friends in Belgium were de-

lighted. Again and again I was asked if I would not go to the Congo to hunt the new peacock. But I was busy writing another volume on the birds of the Congo, and the American Museum wanted that done. When finally I felt sure the book would be complete by early June of 1937, I began to make plans for a trip to the Congo of a couple of months, by airplane. In this I was encouraged by a very dear friend, Millard K. Shaler, one of the mining engineers who made possible the discovery of the famous diamond field of the Kasai. My expenses were guaranteed by three other generous friends, Charles W. Boise, Dan Heineman and W. Hallam Tuck.

Mr. de Mathelin had meanwhile put me in touch with the medical man at his mine of Angumu, Dr. Pierre Dyleff. He assured me that *Afropavo* could be found there; and in order to have skins prepared of any that might be brought in, I borrowed Musoba, a bird skinner I had trained in 1927, from the Albert National Park.

The day of my departure was approaching. Would I find anything to bring back? Or would I spend a lot of money to no avail? My joy may be imagined when on May 23 I received an air-mail letter from Dr. Dyleff announcing that he now had one skin of *Afropavo* for me. Only a few days before I was to leave Mr. Wilson sent photographs of a peacock recently killed near Inkongo. Now there was no chance of failure.

On June 19 I was bid a fond farewell by the Schoutedens and other Belgian friends as I stepped aboard a big Sabena plane at Brussels. Four days later other friends greeted me at the airport of Stanleyville, Pat and Mary Putnam, Tony Orta, Jean de Riemaeker, Charles de Leuze, and Nkotiba, a bird-skinner trained by me at Lukolela in 1930-31. A letter from Dr. Dyleff informed me that he now had four skins of *Afropavo*. In addition, Dr. Els, Veterinarian at Stanleyville, showed me two peacocks preserved with salt and formalin.

Mr. de Leuze drove me to Angumu a few days later, and I also made a side trip to Ayena, a new mining camp in the forest, much nearer to Stanleyville. It was a joy to meet Dr. Dyleff and thank him for all he had done to make my venture a success. Musoba and Nkotiba were appointed instructors in a school of taxidermy started on a verandah, with three pupils, so that after my departure other specimens could be prepared for the Congo Museum.

Mining around Angumu had been going on for more than seven years, with inevitable destruction of forest and a great deal of hunting. I soon found that the chances of my seeing a peacock in the immediate vicinity were slight, and I decided to accept the invitation of Philippe de Braconier to go back to Ayena. There he had often heard from his house on a hilltop the nocturnal calling of *Afropavo* in the forest trees. He lent me a native hunter, Anyasi, who knew their habits well; and within less than a hundred



Photo by the Author

This is virgin forest near Ayena, typical of the haunts of the Congo Peacock. Many trees have tremendous buttressed roots and native hunters say the bird sometimes nests under such trees.

yards of the house we were in the welcome shade of a primeval forest, with game-trails leading in all directions.

That this was really the home of the Congo Peacock there could be no doubt. Late in the dark afternoon of the second day I saw a black form running between the bushes, and at the same time heard another large bird rise on our right, flapping noisily off into the forest. Anyasi darted after the bird on the ground, fired once, and then I caught a brief glimpse of a male peacock as it winged its way off between the trees. The following day Anyasi saw another pair which eluded him by running, so I urged him to get a couple of dogs. Years before I had learned how useful they were in hunting the forest guinea fowl, to drive the birds into the trees. Thus we continued our hunt with a couple of friendly little mongrels.

One morning we were working the slope of a long forested ridge when I saw Anyasi lower his



Photo by the Author

Anyasi used mongrel dogs to flush the Congo Peacock. Here he has just come out of the forest with an *Afropavo* he has shot.

gun and run forward toward the dogs. One of them was chasing something. Then a dog barked, and two large birds could be heard rising noisily into the air. One soon alighted in a tree, and both Anyasi and I set out to find it. As might be expected, African eyes spied it first, and an old gun with broken stock and but one hammer brought it down. In the few remaining days I could spend at Ayena we found no more peacocks, but they were heard several times at varying hours of the night.

All we had learned indicated that these birds live in pairs, going to roost each evening amid the tall trees. From their roosts they give what we now know is a raucous duet, introduced by a mounting "irro-ho-ho-o-a," and continuing as a monotonous alternation of two calls, "gowé" and "gowah." The second call is the lower in tone, and the two may be repeated thirty or more times. This performance has given *Afropavo* its name of "Ngówe" among the Babali. Certain irregularities in rhythm suggested that both sexes were contributing their parts, and this was confirmed two or three years later by Mr. and Madame Herrling at Ikela in the Tshuapa district.

The Herrlings obtained two different pairs of Congo Peacocks and kept them very successfully in a large cage, well shaded. The cocks fought, to be sure; and eventually there remained but one of them, with two hens. It was learned that the voice of the male was higher in pitch; he produced the "gowé," to be followed immediately by the deeper "gowah" of his mate. One of the hens even built a nest and laid three reddish-brown eggs. One chick was hatched, but died four or five days later, and unfortunately could not be preserved. Anyasi had never seen a nest in the forest, though once he did watch a pair with two young, and it seems probable that no more than four eggs would be a normal set.

When I returned from Ayena to Angumu Nkotiba had prepared still another skin of a peacock brought in by a hunter. I now devoted my time to making sure that the Congo Museum would receive more specimens, and five weeks after my arrival at Angumu I had to start off again on the trip to Uganda, where an Imperial Airways flying boat would pick me up at Port Bell on August 27 and carry me back to Mar-

Native bird-skinners had to be trained in the art of taxidermy so Dr. Chapin established a school at Angumu. Several of the boys became expert skinners very quickly.

Photo by the Author



seilles. My return to Tervueren was triumphant, for I brought the six skins obtained with the assistance of Dr. Dyleff, Musoba and Nkotiba, as well as a seventh flat skin of a cock *Afropavo* contributed to the collection by a friend of the Doctor's.

During the next two years Doctor Schouteden and I wrote many letters to the Congo and received a great deal of information about the range and the local abundance of *Afropavo*. News kept coming to me even during World War II, and by now two dozen specimens or more have been obtained. Messrs. Hodgson and Coultas, in 1938-39 secured seven, of which two are in the Museum of Comparative Zoology. Mr. Jean Delacour then was seriously considering sending Charles Cordier to the Congo for *Afropavo*, but political conditions and the fact that the bird had been accorded legal protection interfered. For several years we had no report of the presence of the peacock much to the west of Ikela and Lusambo. Why it was unknown in the forest about Boende, Coquilhatville, and Lake Tumba is still a mystery. But after the end of the war I was informed that the Royal Museum in Brussels had received a female taken in 1938 in the vicinity of Lukolela near the middle Congo River. It was collected by Mr. R. Massart, an employee of the Plantation where I had once worked for the preparation of a forest bird group in the American Museum. As late as 1937 Nkotiba had assured me that *Afropavo* was unknown at Lukolela; but now he tells me that it is reported to live in the country of the Mpama

tribe, only six hours travel by bicycle to the southeast of Lukolela.

This would mark a tremendous extension of range to the west, and gives hope to expect that here and there, in many propitious sections of forest, scattered populations may yet be discovered. The fact that some large areas of fine forest, in the Ituri basin, for example, seem devoid of peacocks I attribute to persecution and extirpation by pygmies and other forest hunters. Its loud calling during the night betrays it.

How to protect this interesting and important game bird is a difficult question. Europeans may understand and obey the law, but it will be a long time before the natives dwelling in the remote forest areas change their attitude toward the "Itundu," as so many of them call it in the region around Stanleyville. Only by learning as much as possible about the distribution of *Afropavo*, its names in all the various tribal dialects, and spreading information about it through the Territorial Administrators, will progress be made. The native chiefs must learn that the government disapproves of its killing for the pot, and they must spread that word among their people.

The Belgian Congo is now thoroughly "okapi-conscious" and "gorilla-conscious." It has begun to appreciate its peacock; and when, thanks to the New York Zoological Society, this handsome bird makes its appearance in the Zoos of the civilized world, a great forward step will have been made.

Long live the Congo Peacock, may it prosper and multiply!



The village of Mangandu, 225 miles by road southeast of Stanleyville, was the headquarters of the Society's Afropavo search.



Chief Lisa, who exercises firm control over the neighboring villages, sent native hunters into the forest in search of Afropavo.

Scenes of the Society's Congo Peacock Quest

MEMBERS of the Zoological Society have already learned through the Newsletters from the Belgian Congo that Charles Cordier, the Society's animal collector, has three Congo Peacocks — two females and a handsome young male. It was not possible to illustrate the Newsletters with photographs of the area in which the birds were caught, but here we present a few scenes.

Up to the present, we have no actual photographs of the birds themselves. Invariably they were brought into the Society's base by native hunters at times of the day when there was not sufficient light for pictures, and in any event it was more important to give the birds something to eat than to

Congo Peacock hunters from Misingi's village encamped in the forest, about two hours' walk from the village of Mangandu.



At Charles Cordier's base camp at Bongena, a series of out-of-doors pens was under construction to shelter the Congo Peacocks.





Sergeant of Police Petro Gwabele (in full dress uniform with his wife and son) was the Expedition's great friend and advisor.



These are the men who actually caught the Society's Congo Peacocks. Headmen Misingi and Nguereza (dark jackets) are in front.

pose them for pictures! Usually they had been caught early in the day, had had nothing to eat for several hours, and were listless and weak from hunger. What they wanted most was food (hard-boiled egg and raw meat) and water. Then, after Charles had coaxed them into eating regularly, they were too vigorous to be handled and turned loose for photographs.

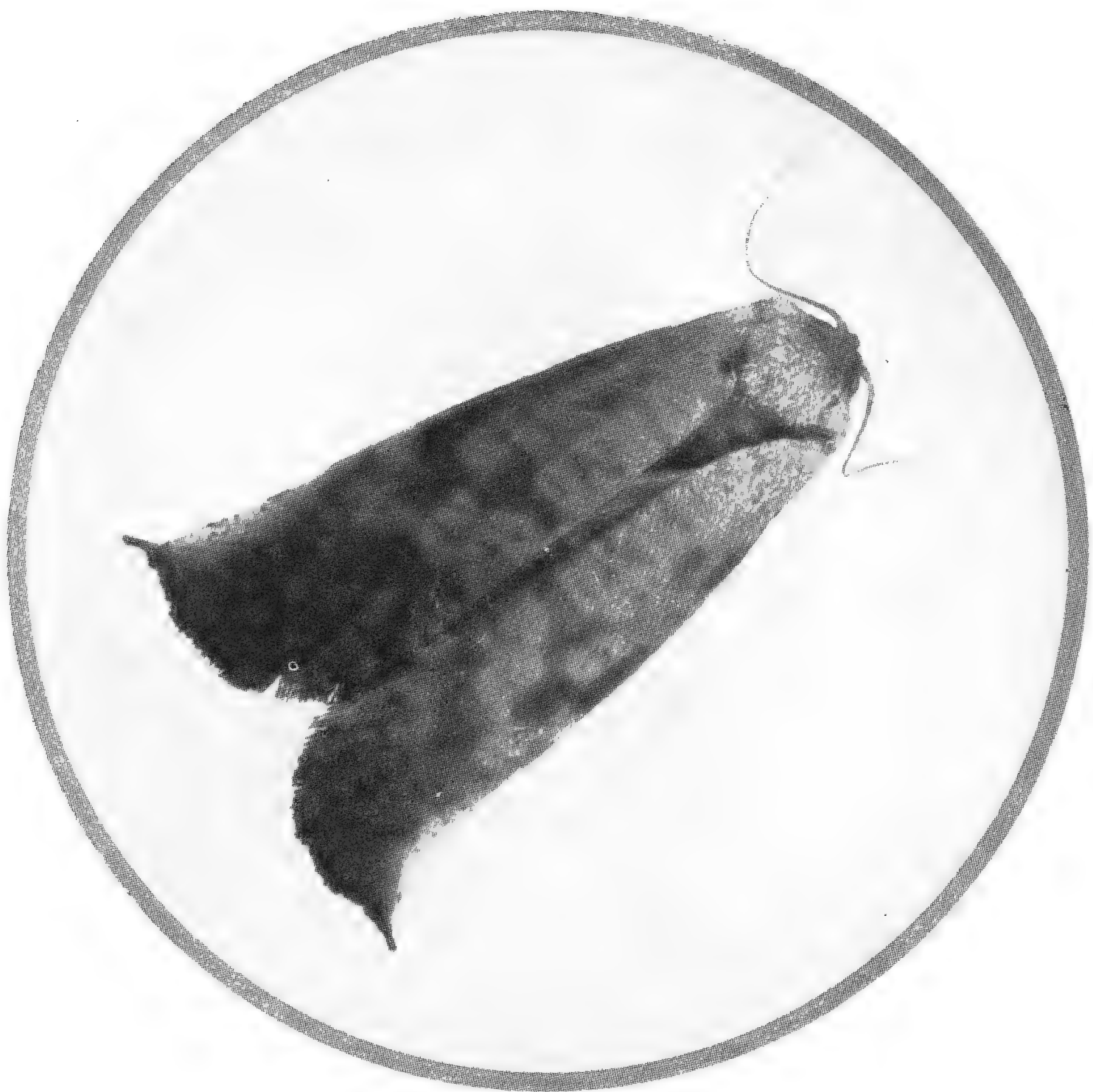
The village of Mangandu was chosen by Charles for the first intensive Congo Peacock hunt because here, a few years ago, Chief Lisa's hunters had the luck to catch several of the birds in one week. Afropavo (the generic name of the Congo Peacock) is still plentiful in the virgin forest of that region, and all the Society's birds were caught within three or four miles of the village, by hunters who established primitive camps in the forest and set dozens of snares in likely spots among the underbrush. The hunters liked the assignment to go Congo Peacock hunting — it was a welcome change from their usual business of growing plantains and manioc roots.

Loading the Expedition's jeep to carry the male Afropavo from Mangandu to Bongena. It is in the basket — Charles is on crutches.



Part of the staff it takes to run an animal camp in Africa—Mrs. Cordier (with owl and Tree Pangolin) and her various helpers.





The Miracle of the Palisade Bell Moth

By WILLIAM BEEBE

AMONG THE MOST ABUNDANT of our small, northern moths are the bell moths (*Tortricidae*), so named from the campanula-shaped outline of their wings. The infant grub of the apple-borer lies cuddled snugly at the core of many an apple into which, as children, we have bitten. Other species attack leaves, berries and fruit. All lead simple lives of egg, grub, pupa and moth, and desire only to be let alone by such enemies as birds and children.

At nine o'clock on the evening of June 11th, a small, tropical bell moth, belonging to this same family, flew out of the jungle darkness. It alighted

on the wall of the roof of my laboratory at Rancho Grande, in the heart of the Andes of Venezuela. I made a note of its Alighting Position and then edged it into a small glass dish.

At midnight I placed this on my table in the laboratory, and went to bed. In the morning I hoped to record its Resting Position, for these postures are as important as they are unknown. The moth was a most inconspicuous little being, clad in browns and grays, but, unknown to me, it possessed the power to work miracles.

At six the next morning I returned and saw that the moth had been very busy. In these few

hours she had deposited a low, rounded island of some three hundred turquoise eggs, and, as if to make it harder, had laid them upside down on the glass lid. Around them was a narrow, clear area, and outside this a circle, a ring of irregular dots. Even under the low power of a microscope these were nothing else. Some impulse made me tilt the round glass cover, and there came to my eyes, like a sudden stereoscopic vision, a three plane view. The ring was not one of dots, but of tall, very slender scales. The eggs were safely fenced in by a dense stockade, each post tapering abruptly to a sharp, needle-like point. Each stood sturdily erect upon a flat, bean-shaped base, and so close together that no insect, however small, could pass between.

Viewed obliquely downward as from an airplane, the tableau recalled a tiny, rounded, green islet set in a narrow lagoon of glassy water and enclosed by an atoll of hundreds of cocoanut

palm trunks, all denuded of their heads of fronds.

The palisade ring was imperfect, being broken in one small segment, apparently due to the exigencies caused by the abnormal conditions of the glass container, as the displaced scales were scattered irregularly about. The palisades stood ten to fifteen deep, and the ring was more than an inch and a half across.

The little mother rested quietly at the bottom of the dish. Her body was somewhat shrunk, which was to be expected after the loss of three hundred eggs and three thousand posts. She had considerable vitality left but I knew she could only live a day or two and I could not risk injury to her wings. So she was gently put to sleep, and mounted with an entomological epitaph of the date, place and her special number 46564. In the course of time a man who is learned in the genealogy of bell moths, identified her euphoni-ously as *Aesiocopa patulana*.

Overnight the moth deposited some 300 eggs on the cover of a laboratory dish and around them set a palisade of scales, each "post" tapering to a needle-like point. The palisade was 10 to 15 scales deep, and more than an inch and a half in diameter.



The body of the moth showed no bare patch, and only at the tip was there an area of specialized scales, less than five hundred in number. These were like individual diminutive pillars and recalled the appearance of the Giant's Causeway in Ireland. For some time the miracle of 3,000 scales from 500, leaving at the same time no bare place, seemed insoluble. Careful examination under a microscope revealed nothing until by accident pressure was applied. The single scale became a sheath, from which sprang several of the palisade scales. More careful and directed pressure produced twenty to forty scales from each sheath, and the 3,000 were accounted for. The method of deposition, the source of the adhesive material, the manner of application of the exquisitely regular series, their even spacing and uprightness, no two touching—all this was known only to the moth and she would not tell.

Gradually, day by day, the eggs changed from turquoise to dark blue, to olive, and finally the little black eyes showed clearly. The caterpillars began hatching on June 22nd, eleven days after the eggs were laid, and a third of the tiny beings had already emerged and vanished by six in the morning.

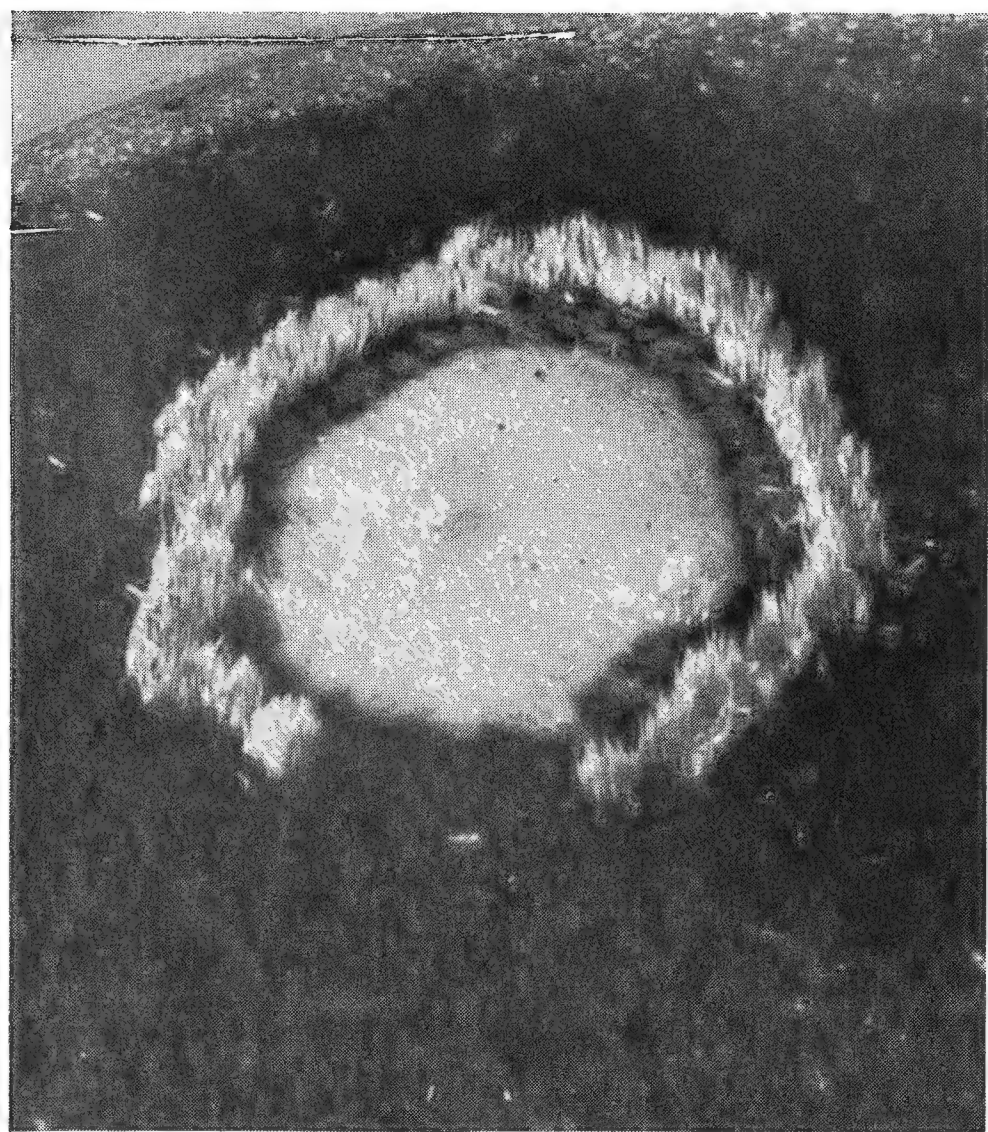
I watched a pair of black jaws which had just appeared, chewing upwards into view in the egg expanse. I started the stop-watch. In two

minutes the caterpillar had gnawed a hole of his body caliber, pushed up and out, and began crawling. He completed a small circle, then turned toward the light, crossed the open take-off, mounted, crept over and reached the far side of the palisade in exactly two more minutes. In four minutes he had encountered and surmounted his life's first obstacle.

This palisade traverse bothered me. It was altogether too easy, for the stakes were as erect, the points as sharp as ever. I made a slight shift in focus of the microscope lens and the mystery was no longer a mystery. A wide pathway up and over the chevaux-de-frise was covered with the thinnest of thin silk webbing. The apparent casual weaving back and forth of the larval heads became significant. The speed and ease of crossing were explained by the soft approach ramp and the silk carpet over the spines.

I now revolved the glass cover holding the egg mass, half a circle away from the light side. Closest examination of this former darkened section showed only a few stray strands of web. After a minute, a second tier larva began to shred and tear his cell wall.

When he had eaten through the confines of his particular egg, he walked a short distance and then made quick work of a trap-door in the roof, for the emerging of the earlier caterpillars had cleared a large space beneath the transparent, communal ceiling. The larva emerged in par and at once set out lightwards. As soon as he touched the first palisade he began weaving, but proved to be a pioneer, not merely adding a rat-line here and there to the suspension bridge of preceding brethren. His was the hard way, he made slow progress, it was difficult going. On his posterior pair of prolegs he raised himself half way up a vertical scale, and with bent head wove the first warp of a silken path. The palisades were as strong and efficient as when they were first mysteriously planted by the parent moth, and the larva would touch and flinch at each sharp point. Then he would pull back, reach down and draw out another strand of silk. This



It was only when Dr. Beebe tilted the glass that he saw the eggs and palisade in "three-dimensional" view. This oblique view shows the arrangement of the 3,000 palisade scales.

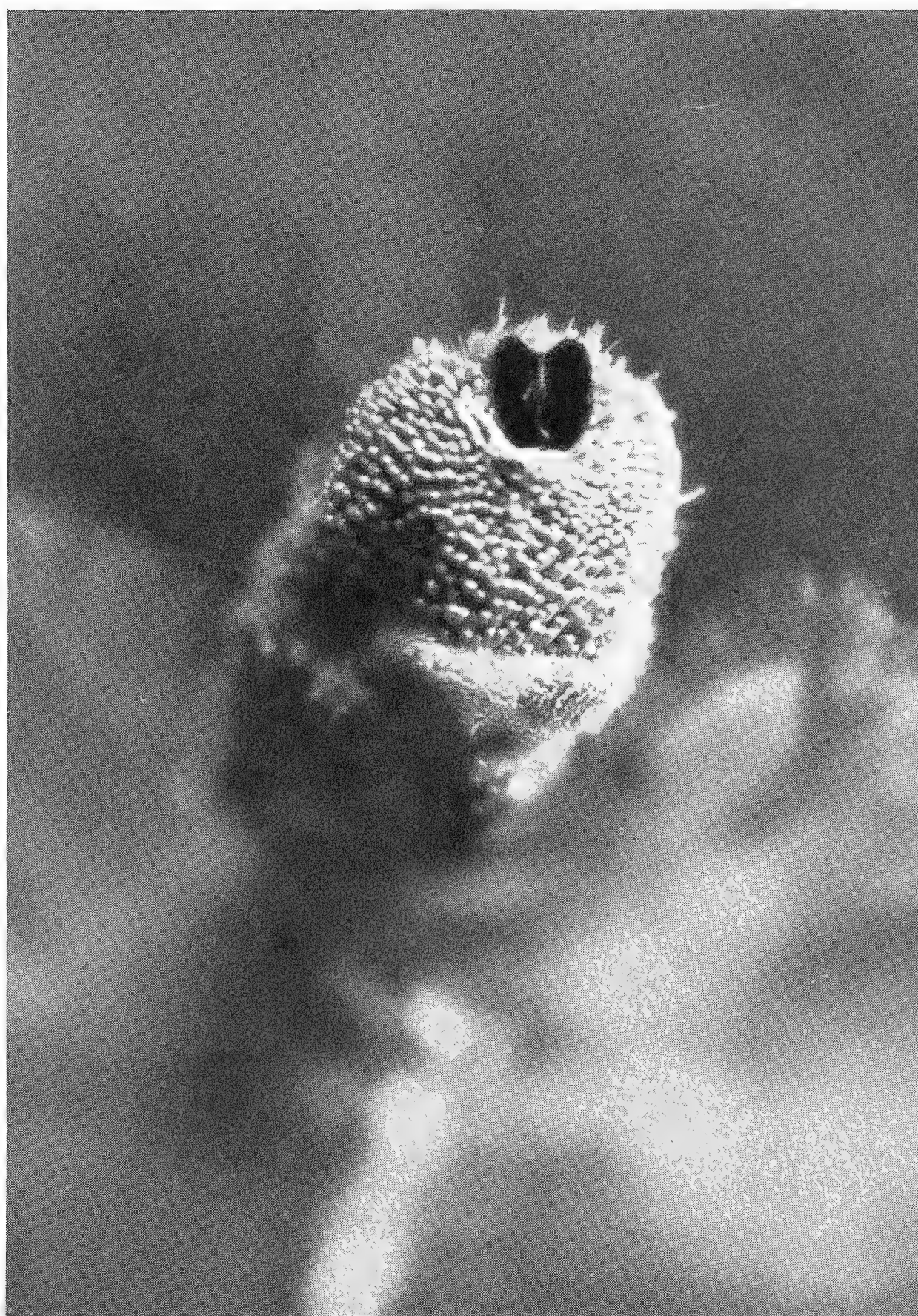
Under powerful magnification the abdomen of the Bell Moth looks like this. This is the end of the abdomen, showing 300 palisade sheaves—each containing 20 to 40 scales.

was then wound, muffler-like, forming a soft wad around the needle tip. Another step was taken, with much irritated jerking and twisting, and finally the hindmost pair of legs of the caterpillar gripped the very summit of the wadded spike head. This provided a new periphery, enabling him to reach two further palisades.

An unfailing instinct held him straight on—the inevitable pull of the light. He never stopped or wavered. Close on the left the stakes thinned out, leaving a free alley for a short distance of the traverse, but he did not see or else ignored this easy but oblique path. He held straight on, travelling the shortest line which led directly toward the light. I now revolved the whole glass so that at this stage he was suddenly headed toward the darker direction. But the formative period of the light-pulling instinct was past, it had done its part, it was now past history. The caterpillar kept on, and when free of the obstacle it humped full speed toward the darkened direction of the great outside world.

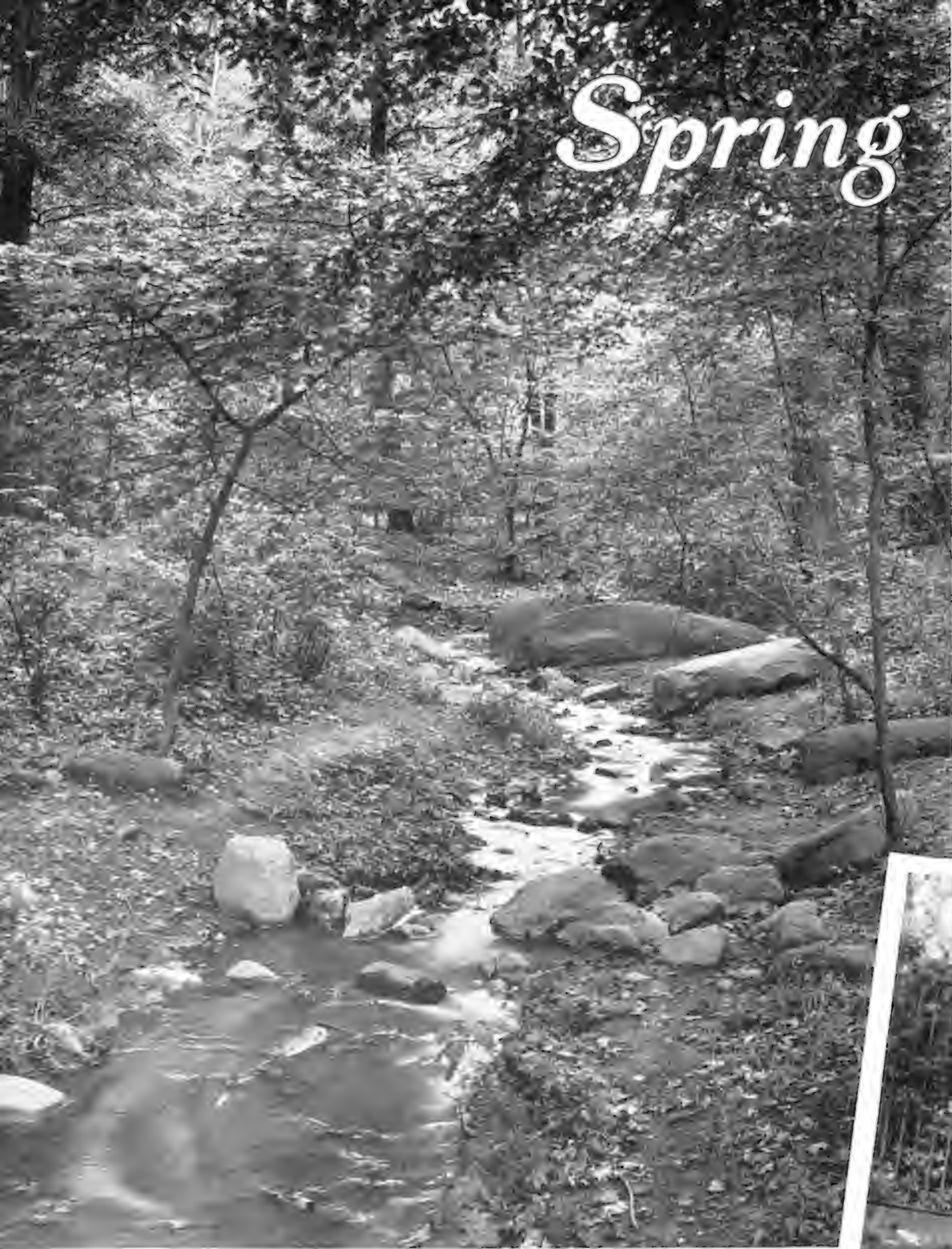
I watched another larva emerge and do his palisade crossing and when he had reached the outermost rim of the glass, I touched and lifted him with the entangling hairs of a camel's-hair brush. He payed out several inches of web, dangling in midair, and I dropped him again on the egg mass. He righted himself, cut his ripcord and began walking rapidly about. Now and then he met and crawled over another larva, or stopped for a moment at the touch of a black head arising from its cell. All the larvae hatching while he walked about—six altogether—went through their post-natal routine: all emerged, crossed the clear space, scattered some web, hopped the fence and started out full of directed energy. My returned caterpillar still roamed aimlessly. He would set off in high gear over eggs and bodies until he reached the palisade, feel about for a moment, then turn and step out in another diagonal, and again turn back.

The last I saw of this confused caterpillar he was resting quietly close to the egg opening from which he had emerged. Five hours later he was



still there and quite unresponsive to any effort to arouse him to activity. I had interfered with his set routine, his sequence of instincts; I had set back the time clock of his life and he refused to repeat and catch up again. Quite uninjured, he was again in the identical situation, with the same means to scale the obstacle, but reaction to it had run down. He had come to the next item on the program, to walk, walk, walk until, under normal conditions, he would have probably arrived at the leaf which the equally blind instinct of his mother should have placed within his reach. Foiled in this, he became obsessed with a meaningless quiescence. My ignorance meant his death, for even if I had not interfered with his routine, I had no possible means of knowing which of the thousands of jungle plants growing about Rancho Grande was the only one suited for his nourishment.

Spring comes t



The Hippopotamus
has that lazy feeling

he Zoo!



For the Mallards,
Springtime is nest-time





Even the Elephants
know it's Spring





Hearts and Flowers motif





SPRING TONIC

(From Arthur Sasse's Exhibition
at the Zoological Park)

Before

After



Weighing one of
Dacca's cubs.
Mrs. Martini
thinks it's
Christmas morning!



This is what Spring does to a Rhinoceros!

The Marsupial Devil of Tasmania

By DAVID FLEAY

All photographs by the Author

FAR DOWN in the tumbled silent region of uninhabited southwestern Tasmania runs the icy Erebus River. It is one of many such streams, dark and mysterious and beloved of the Platypus, under the overhang of thickly growing myrtles (*Nothofagus*) and tangled growths of horizontal scrub, *Bauera* and tree fern. It is the color of milkless tea because of the percolation of its waters through the peat of the button grass. Along both banks under the dense canopy of foliage run well defined animal pads—angling here and there between mossy trunks and at times bifurcating to ascend recumbent butts of fallen tree giants spanning the cold rushing river. In soft spongy ground the imprints of the nocturnal users of these traffic arteries of the wild show plainly. One picks out the bird-like Wallaby feet, the solid foot marks of Wombats, the dainty prints of Dasyures and the unmistakable plantigrade impressions of Tasmanian Devils.

I mention the Erebus River, for though I had kept, bred and observed the marsupial Devil years beforehand, it was only here in the summer of 1945-46 that our expedition made per-

sonal contact with the animals in the wild for the first time, and so experienced the thrill of meeting this extraordinary “living fossil” carnivore in the remote area of its last stronghold on earth.

Most people who have seen the powerfully built, fox-terrier-sized Devil (*Sarcophilus harrisii*) are not likely to fall in love with his ugly appearance, his peculiar odor, his moist wet nose, wire whiskers, outsized head, whining snarls and continuous sniffing. Yet he is a creature of many entertaining antics and distinctly unusual ways, revealed quite readily if one goes to the trouble of rearing young Devils from babyhood. The animal's position as the second largest living marsupial carnivore—soon perhaps to be the



largest, with the rare Tasmanian "Wolf" on the brink of extinction — invests him with a peculiar natural history interest. Personally I have quite an affection for these ungainly creatures — but I must admit that not everyone can have the experience of watching and enjoying the antics of baby Devils at night in one's own living room. I did have that experience.

This strongly built but rather clumsy animal appears to have lost its grip on the mainland of Australia and eventually disappeared entirely from the continent following the introduction of the Dingo by an early native race. The marsupial Devil was outmoded by the efficient wild dog — a member of Nature's modern school of specialized intelligent hunters. Fortunately for



natural history, neither the Dingo nor the European Fox ever reached the rugged southern island of Tasmania and in spite of settlement it is still comparatively rich in marsupials and monotremes.

In many ways the Tasmanian Devil occupies in its own island fauna the niche belonging to the hyaenas in their particular sphere. When marsupial "Wolves" were in their hey-day, it was the Devils that cleaned up the carcasses of Kangaroos and large Wallabies after the Thylacines had hunted, killed and removed their own choice morsels from their victims. Devils are keen hunters, but also natural scavengers, and no item of food is too insignificant, be it frog, snake, small lizard or putrefying flesh. Even large insects are sought out and devoured. I have seen them chew up an elderly, tough, Muscovy drake, disposing of feathers, feet, viscera and most of the bill. All is grist that comes to the Devil's mill! It was my wife's discovery, not far from the Collingwood River crossing of the West Coast Road, that Devils actually kill and eat the deadly but sluggish Tasmanian black Tiger Snake. Faeces found on animal trails there and later in other localities contained scales, vertebrae and ribs of these reptiles. Also in the droppings were skins of the friendly and pretty little island lizard (*Lygosoma casuarinae*) and more commonly the fur of their usual prey — the Rufous-bellied Wallaby and Island Wombat. At a pinch Devils may even make a snack of a creature usually held in extreme distaste by carnivorous mammals and birds of prey — the domestic cat. Mr. A. D. Fergusson, one time Ranger of Lake St. Clair Reserve, central Tasmania, told me of one old, old Devil that rushed through his open doorway one winter night and attempted to drag a drowsing cat from the hearth for its supper!

The Devil is surely one of the world's noisiest imbibers and when drinking water the "clop-clopping" of its tongue is clearly audible at a distance of fifteen to twenty yards.

The animals are nocturnal, rarely being seen except as dim shadows in the bush at dusk, but

The Tasmanian Devil is a powerfully-built animal, about the size of a fox terrier. Its head is massive, its canine teeth strongly developed — altogether an unlovely animal.

they are fond of emerging occasionally from their hidden lairs to stretch and bask luxuriously in the sunshine. At such times their ears become even redder than usual, a circumstance possibly associated with the absence of sweat glands, typical of marsupials, and they soon become very hot and uncomfortable. Fur trappers who still carry on large scale operations during the winter in western Tasmania cordially dislike the snare-despoiling Devil, and often go to extreme lengths to rid a particular area of these animals before the season begins. An old pine shack below the frowning Frenchman range is still known as the Devil's Camp—thanks to the pitiless work carried out by the first snarers, who poisoned and trapped the unfortunate carnivores so that their whitened bones lay in that vicinity for many years afterward. The “drop door” cage traps used by our expedition for securing Devils down on the Erebus River and other parts of the southwest were collapsible structures carried in sections to these remote areas by pack horse. They were baited each evening with either parrot, bacon or Wallaby meat, and in order to attract our quarry, scent trails were created by dragging scorched meat on a string from trap to trap over a distance of perhaps several miles.

On following mornings, wherever tracks would “take” in soft ground, we read the tale of odd Devils following the aroma where their prints were superimposed on our own. Their wariness in circling the trap without entering sometimes lasted for two or three nights. In all, over three and a half months, (November, 1945; January, February, March, 1946) we caught nineteen Devils; some fully grown, others half-grown specimens of the previous winter's breeding season. One bristling-whiskered mother had the maximum number of four “joeys” bulging out of her pouch. On another morning, I was astounded to find a “catch” wearing a glistening yellow metal collar and this fact was all the more mystifying because of the remoteness of our surroundings. Then I recalled that two weeks before a special composite foot snare of brass wire and hemp, set for a Marsupial Wolf, had been found sprung and bitten off! Another huge fellow, a grand old man of the Erebus, glared balefully from behind a shut door one morning and when I turned him loose he rushed for the river

bank, dived into the icy current and swam strongly to the opposite side, disappearing among the ferns. On an early morning round of the traps it was exciting to see the trap doors down, but not so good to find that *Rattus lutreolus*, the chubby swamp rat, had dined heartily on the bait and then quietly slipped out through the mesh!

Most of the Devils in this southwest region were almost completely black, with the merest traces of the usually large white patches on rump, chest and shoulders found in Devils further north and east. Like many other animals, Tasmanian Devils vary a good deal in disposition. Some are extremely pugnacious, and should two such individuals meet, their rasping, whining, hymns of hate, rising to a savage crescendo, are louder and more startling than the cries of any other Australian beast. Vicious snarls ascending to fierce screams are interrupted by the clashing of their abnormally large teeth and the sounds of battle carry far in the stillness of the night. It is not uncommon for large males to interlock their jaws and then the crunching and breaking of their tusk-like canines is blood-curdling and nauseating. But these are the bad-tempered Devils. There are others that whine and snarl merely as a form of “polite” conversation, while their antics proclaim their complete good humor. Nevertheless, it requires all one's nerve and self-control to go into the cramped area of the cage traps to release newly caught and somewhat desperate Devils. Movements must be slow and deliberate; any abrupt action in the attempt to remove a captive spells disaster. The only mishap from our Tasmanian expedition, apart from bitten fingers sustained in the recapture of two young Devils that ran about the steamer deck all night on the way home, was a painful elbow bite from the last Devil caught. It made a dash for liberty during cage cleaning operations on the shores of the Great Lake, on Tasmania's “roof.” My ensuing flying tackle was effective but fraught with painful results when the “lady” retaliated with a scissors-to-the-elbow.

Both father and mother in the Devil family possess a well-developed nest-building instinct and in the cave, hollow log or cavity among upturned tree roots where they sleep away the daylight hours, they fashion bark, button grass



This prospector's hut on Ridge Creek in southwestern Tasmania was Mr. Fleay's base for ten days during his hunt for the Tasmanian Devil. Dasyures — Native Cats — raided the camp at night and captured Devils were penned up in the hut — where they kept everyone awake.

or leaves into a comfortable bed. In captivity they are quite ready to adopt bags or straw as substitutes. Ensnared in such a comfortable home, away from marauding males of her kind, which are not above cannibalism where tender youngsters are concerned, the mother Devil produces her babies each year at the end of May or very early in June. Arrival of the young is strictly seasonal. There are four teats deep in the pouch and therefore accommodation is limited to four joeys, cubs or Devilets — whichever you are pleased to call them. The pouch, by the way, is insignificant in its off-season state, only developing to form a definite pocket several weeks before young are due. Interestingly enough, also, is the fact that its roomy part is anterior to the opening — not posterior as in the case of the jumping or upright marsupials. Thus mother Devil running on all fours cannot easily

snag her pouch on sticks as she runs through the scrub.

In order to examine the pouch and make notes on the development of the babies, I found it convenient to use the Devil's stout, carrot-like tail as a handle — always remembering to keep well clear of the fierce array of teeth at the opposite end! The change in the pouch indicating its seasonal development begins in April and from this time on it enlarges more and more — the internal lining becoming glandular and moist and covered with a reddish pigment. To record the progress of young and the idiosyncrasies of the mother I cannot do better than describe a successful "event" among my Devils in 1934. As far as records go, the Tasmanian Devil appears to have bred in captivity only once previous to the occasion described here. Some thirty years ago the late Mrs. Mary Roberts of Beaumaris

Zoo, Hobart, first brought about the breeding of this species.

The large, robust, male of the pair I had selected to breed was a fine sabre-toothed chap who adopted a marked proprietary air towards his mate. During April when I visited their enclosure at night he would rush forth with bared teeth, giving sharp angry sniffs and wheezing coughs that sounded as if he were saying "Horace!" as he attempted to jump upward and bite. Usually he moved about his run with the clumsy, stiff-bodied, cantering gait and elevated

tail so typical of his kind. In the first days of June four tiny, pink, naked and blind babies, each a half-inch in length, had betaken themselves to their mother's pouch. Shortly after this the father was removed to bachelor quarters, for the mother now showed resentment of his presence by sustained whining growls rising abruptly in pitch and volume whenever the male attempted to enter the rock shelter. Early in August, at the age of seven weeks, the thickset babies in the pouch had grown to a length of two and three-quarter inches. They were still



pink and hairless but now it could be seen that as they clung tenaciously to the teats within the pouch they moved their tiny limbs actively. They also made slight squeaking noises and as they increased in bulk the hind quarters of one projected from the pouch as the mother moved about. Meanwhile she had become somewhat fastidious, for a Tasmanian Devil, disdaining raw meat but delighting in rats, birds, eggs and rabbit heads.

Towards the middle of August a great change came over the appearance of the youngsters. The ear tips and then other regions of the skin began to show dark pigment. The mother's pouch, too, developing in pace with the family, was far more relaxed and roomy. At eleven weeks the dark pigment of the young had become sufficiently pronounced to throw into strong contrast the future white chest and rump markings. The quiet but nervous mother accepted frequent handling with no sign of resentment. Progress of the little Devils now became rapid, and on October 1 at fifteen weeks of age they first released their grip on the teats, which up to then had never been relaxed. They were well furred and their eyes had opened. From these observations it is obvious that the mother must carry her cumbersome family with her for at least fifteen weeks after birth; but from this time on the youngsters may be left at home in the nest, allowing her the very necessary freedom for successful "scrounging." When lifted away from the parent the young animals uttered anxious yapping cries and on being released again clung quickly to the fur of her sides with teeth and toes. The forefeet of young Devils have unusual grasping powers, so that they are expert climbers. When they were disturbed as they slept in the shelter of the mother's body, the little fellows lost no time in obtaining a grip on her elastic teats, and from here it was almost impossible to dislodge them unless a finger tip was pressed firmly over their nostrils until they opened their mouths. At the age of eighteen weeks the "play age" was apparent. Although

These young Tasmanian Devils (three out of a possible brood of four) are 32 weeks old and soon will be able to leave their mother to take up their own self-sufficient lives.

of a totally different color, the young Devils now resembled *Dasyures* (Native Cats) because of their sharp-featured faces which lacked the bluntness of the older Devils. At twenty weeks they were seven and three-quarter inches in body length, with small tails adding a further three inches. They still clung tenaciously to the mother's teats when drinking.

In 1946 at the Badger Creek Sanctuary four baby Devils, approximately eighteen weeks old, were accidentally lost by their mother in a rat warren. There they remained for eight days during which time they had neither food nor drink. We gave them up as dead. It says something for the toughness of the species that when they were finally rescued, the emaciated little fellows immediately set about making up the leeway by drinking from their mother for days on end. All survived the ordeal.

To further the education and general taming of the four young Devils, it was considered advisable to separate them from their mother at night. Each evening, from the age of eighteen weeks onward, they were given the run of a lighted room and after two or three appearances the sharp-nosed little fellows gained confidence. They scampered among couches and chairs and even attempted to climb curtains. When two of them happened to meet they usually halted a few paces apart and then made mock attacks, rushing forward with open mouths, ridiculous snarls and much simulated ferocity. They were real young Devils! It was five months before they ceased to rely on their mother's milk for nourishment and unfortunately we lost two of them before they had abandoned the maternal apron strings. One squeezed through the chain netting of the enclosure and was never heard of again, while the other simply sickened and died. The mother and the remaining two youngsters showed the scavenging traits of their kind by immediately devouring most of the carcass of their deceased relative, even though other food was plentiful. The surviving two, a male and a female, became fine adult specimens.

Like most carnivorous marsupials, the Tasmanian Devil has a comparatively short life, and as far as I am able to ascertain such an animal at the age of seven years has lived its allotted span.

NOTES ON THE SOCIETY'S CURRENT WORK IN CONSERVATION, RESEARCH AND EDUCATION

WE MUST THINK MORE BROADLY ABOUT ANIMAL LIFE

(Continued from Editorial Page)

for "human beings only." We would elevate this whole great conservation movement by applying the maxim "Do unto others as they would you should do unto them" to the animal kingdom, whose existence, for better or worse, now depends upon man's sufferance.

Also, why should we not come right out in the open and declare ourselves defenders of the things in Nature that are beautiful? My guess is that a wildlife program that is solely materialistic and that aims only at the *production* of so many animals for "harvesting" will never rally public opinion to its support in our country. Americans are idealistic, thank God! Probably no cause in the whole field of Conservation within the last few decades has been so widely commended and sustained by the public as that of preserving the beauty and majesty of the Redwoods. You cannot shoot them, get them on the end of a fishing line, or eat them. People

from every part of our nation rallied to their defense because those trees are of the essence of the grandeur of Nature. *All* forms and kinds of animal life are interesting or beautiful or both. *All* contribute, with barely an exception, to the economy of Nature. This is recognized widely. For example, the growth of the National Audubon Society through the years is due, it seems to me, primarily because that institution has endeavored to do everything within its power to preserve birdlife as a whole rather than merely game birds. If you will forgive my attempting to prophesy, I will put it on the line that I would not give much for the chances of the long-term success of a movement that merely is focused upon meeting the needs of sportsmen who comprise at most but a minor part of our entire public. Every kind of wildlife needs our protection. In short, I have an idea that we would do better if we greatly extended our horizons when thinking, talking about and working for the conservation of animal life.

Fish and Cancer Research

For some years Dr. Myron Gordon, the Aquarium's Geneticist, has been studying melanomas (pigmented cancers) in fish. Some time ago the Medical Division of the Army Chemical Center in Maryland began making bio-chemical assays of human melanomas, and became interested in the same kind of malignant growths in fishes. Dr. Gordon supplied test animals from his laboratory, and the Medical Division now reports that fish melanomas give the same bio-chemical reactions as human melanomas. A report on the findings is to be published in the *Chemical Review*.

Honors for President Osborn

Close on the heels of publication of President Osborn's book, "Our Plundered Planet," awards and honors began to arrive. He was one of four recipients of the Eleventh Annual American Design Awards, presented by Lord & Taylor to Americans "who have infused new spirit and injected new hope into our social and cultural patterns."

On May 13 the Garden Club of America presented him with the Frances K. Hutchinson

medal for conservation, at a ceremony at Pittsburgh.

Earlier in May Mr. Osborn and A. William Smith of the Conservation Foundation attended the National Conference on Land Use Policy at Omaha, where Mr. Osborn was the keynote speaker. The conference was attended by manufacturers, farmers, bankers, publicists, educators, merchants and governmental representatives.

As a member of the nutritional section of the National Health Assembly, Mr. Osborn was called to Washington for conferences on May 1.

"Our Plundered Planet" is having an extremely large sale throughout the United States and has received uniformly favorable reviews

which stress the importance of the conservation problem and the necessity for immediate action. Two British publishers have applied for publication rights in England.

Summer Behavior Studies

For the second year, Animal Behavior Research studies will be carried on in the Zoological Park this summer. The students selected for the Fellowships are Dr. Bernard Reiss of Hunter College, Dr. Herbert Birch of City College of New York, Dr. Sherman Ross of Bucknell and Samuel Lysterly, M.A., of the Psychology Department of Pennsylvania State University.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Platypuses: Second Year

By LEE S. CRANDALL

BEFORE David Fleay arrived from Australia with our three Platypuses, in April, 1947, we had a vague notion that it might be wise to let him take them back to their native land, after a decent interval. The only previous experience with a Platypus outside Australia was our own and the 47 days of its survival did not permit us to contemplate the coming winter with confidence. We really thought that if we could stretch those 47 days to, say, three months, we should do well to rest on our laurels.

David, however, quickly brought us face to face with reality. He had brought the Platypuses safely through one voyage. He had no intention of tempting fate by trying for a duplication of the feat. The Platypuses were here to stay.

In late summer, when it became evident that the need for winter plans was a necessity, we set up David's travelling platypusaries in the warm basement of the Bird House. A wire cage

was built around them, proper drainage was provided, all in readiness for the critical moment. This came in late October when with the first light chill of autumn, the animals became so nervous and uneasy that we promptly removed them to winter quarters. Here they settled down at once, under the watchful eye of Keeper John Blair. To him goes the credit for their return to exhibition on May 9, 1948, in the best of health. Having established a longevity record of more than a year, it appears that Platypuses must be considered in any plans for the immediate future.

Reptiles from Australia

The first air-borne shipment of reptiles from Australia arrived at the Zoological Park in mid-May and was immediately put on exhibition in the Reptile House. The transport required only five days from Australia to New York, and all but one of the 29 specimens arrived alive and healthy.

The largest serpent is a gaily-patterned, 5-foot Carpet Python. With it came two Tiger Snakes,

the most deadly species in Australia; a poisonous Red-bellied Black Snake and a colorful Green Rear-fanged Snake.

Of twenty lizards received, all are one to two feet in length. They include the sleek-bodied Blue-tongued Skink, Giant Skinks and Bearded Lizards. The latter have a ring of spines around the neck, which stand erect when the lizard is alarmed.

Four Long-necked Turtles were in the shipment. They have a head and neck actually longer than the shell, but fortunately for the turtle the neck can be folded away like the blade of a jack-knife. — BRAYTON EDDY.

New Telephone Number at Zoo

On June 1 the Zoological Park's telephone number was changed. It is now FOrdham 7-2000. The old number (FOrdham 7-2090) will be automatically transferred to the new number for only a limited time, so we suggest that our Members make the correction in their telephone lists immediately.

Children's Zoo Record

The Children's Zoo had the biggest day in its history on Sunday, May 2, when 7,369 persons enjoyed its playing and Noah's Ark, the Wishing Seat and the Piglet's House, and all the rest of its attractions. The previous biggest day was April 15, 1945, with 6,273 visitors.

The King Penguins Are "In Storage"

By **LEE S. CRANDALL**

SOMEHOW, when King Penguins have come to us, it has always been in early summer. And we know, from unhappy experience, that they cannot survive the high temperatures experienced in New York before the cool days of autumn come.

In October of last year, when a small shipment came from South Georgia to New York by air, we were able to select three birds in excellent condition. We were sure they would thrive in our outdoor Penguin Pool until spring. By

that time, projected air-cooling experiments should be well in hand.

The birds reacted to the cold of winter as we had hoped they would and the approach of spring found them in lovely condition. But our experiment had not kept pace with them.

We had hoped to prepare an air-cooled exhibit, where the birds could be viewed by the public during the summer months, based on the successful installation operated by Dr. William Mann in the National Zoological Park in Washington. However, technical difficulties and mounting costs combined to cause delays that brought us perilously close to the brink of hot weather.

Hastily, we compromised on an aluminum-covered insulated box, 19 feet by 15 feet, complete with air-conditioning apparatus, pool and water-cooler, set up in the eastern extension of the Aquatic Bird House. Two types of condensation-resisting glass have been installed to furnish view-areas. In conjunction, Mr. Coates is conducting investigations of means for preventing condensation of moisture on the outer sides of cold-water aquaria.

The birds were installed on May 20, and we hope to be able to return them to exhibition next October in their present excellent health. In the meantime, there is much to be learned before a formal air-cooled exhibit is constructed.

New Society Offices

In mid-May the offices of the Zoological Society were moved from 630 Fifth avenue to new and more commodious quarters at 30 East Fortieth street, where the Conservation Foundation also will be housed. The address is in postal zone 16.

The telephone number of the new offices is LExington 2-6110.

430 Ducks Banded

During the past winter Keepers Gerben and Winnegar banded 430 Black and Mallard Ducks that came to the Zoological Park's Wildfowl Pond, as a service to the New York State Conservation Department. It was the largest number banded at any station in the state.

Dacca Rears Her Cubs

By LEE S. CRANDALL

TIGERS have been important among the inhabitants of our Lion House since the day it was opened in 1902. But late in 1943 we suddenly became really Tiger-conscious. For it dawned on us depressingly that we never had reared a Tiger cub. It wasn't that baby Tigers were unknown elsewhere—it was just that none had happened to us.

We knew, of course, that few Tigresses will rear their young under the usual zoo conditions. If we hadn't known, we could have learned from Jenny, whose several litters had been lost through her nervous neglect. So we evolved a sketchy four-year plan for providing ourselves with a cub-rearing Tigress. We would lift Jenny's next litter, rear the cubs by hand, and hope that a tame Tigress would do her duty. Mrs. Martini's prowess as a foster mother, already well established, was, of course, the kernel of our scheme.

Everyone knows now that Rajpur, Raniganj and Dacca were born on Feb. 8, 1944, and that Mrs. Martini reared them in her apartment under the constant surveillance of Dr. Goss.

Once, in writing of Dacca, we agreed with Mrs. Martini that she was "sweet." Later as she approached maturity, Dacca became nervous and was so easily disturbed that the success of our plan seemed more and more unlikely. She had chosen big, steady Rajpur as her mate and teased him between spells of groundless fear, in the hoyden spirit she had shown in cubhood.

We had almost given up Dacca as hopeless when word came on May 4, 1948, that she had given birth to a cub. We found her licking it dutifully, on a shelf five feet from the floor. While we watched helplessly, a second cub appeared—and fell to the floor below. Apparently it was uninjured.

After some maneuvering, Dacca was coaxed into the next cage and the cubs were removed to a snug nest in their mother's sleeping box. She took to them at once and during the day two more were born.

After a day of suspense, we found that Dacca was nursing her cubs perfectly. All went well

until the third day, when the cub that had fallen died of unsuspected injuries.

As the days passed, Dacca's personality underwent a curious change. From nervous flightiness, she turned to proud maternity. No longer alarmed by sudden openings of the Aquarium service door opposite her cage, she became indifferent to everything except Mr. and Mrs. Martini and the growing cubs in their den. Each time Mrs. Martini called, Dacca came from the box and rubbed, purring loudly, along the wire of her cage, luxuriating in words of praise. These demonstrations came to a sudden end when Dacca, in an excess of pride, went back and brought out a cub to show her admirers. Now Dacca gets only a brief "hello" and a quick "good-bye!"

So now we have a breeding Tigress and the cubs will soon emerge to prove it!

Dr. Beebe Honored

Dr. William Beebe has been elected an Honorary Member of the California Academy of Sciences, the highest recognition the Academy awards. It is conferred only on the basis of distinguished scientific achievement.

PUBLICATIONS OF INTEREST

TRUE ZOO STORIES. By William Bridges. William Sloane Associates. 127 pp., 63 illus. Age Group A. \$2.50.

For the multitudes of children who love the Bronx Zoo, this book by the New York Zoological Society's Curator of Publications will be a great delight. All the familiar pets are here—Pete the Hippopotamus, Andy the Orang, the Pandas and the Penguins—the animals that experience shows most children prefer. And, best of all, you can always satisfy the most confirmed young skeptic with the assurance that all the stories are TRUE, based on a liberal selection from the vast store of amusing incidents that occur around a big zoo.

Arranged on the plan of the old-time Animal Alphabet, the book is amply illustrated with good, clear and entertaining photographs. The author has employed another fortunate device that will be welcomed by the adult reader who is called upon to answer such questions as "What's an Armadillo?" He narrates his anecdote, and follows it up with enough facts about the species involved to prevent embarrassment and preserve the adult ego. Members of the Age Group A (four to eight years) can read it too.

So many children's books today seem to be planned to charm the parent rather than to interest the child.

But *True Zoo Stories* appears to be constructed for its intended audience—a collection of true tales about the animals children love best, all well illustrated and amusingly told, and all apparently about the right

length to hold the fitful attention of the very young.

Mr. Bridges' anecdote about the *Afropavo* presumably will appear in the sequel to this volume. — DONALD T. CARLISLE.

New Members of the New York Zoological Society

(Between March 1 and April 30)

Life

Norman A. Henderson
Ernest G. Jarvis
Sydney H. Murley
Richard Shields
Oakleigh Thorne, II

Schools

Barnard School for Girls
Miss Hewitt's Classes

Contributing

John W. Barnes
Mrs. Mellon Bruce
Miss Audrey Davies
Miss Marion Davis
Arthur H. Dean
Desmond Fitzgerald
John A. Fitz Randolph
Mrs. Aquila Giles
Albert H. Gordon
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Oscar R. Lichtenstein
Mrs. Flagler Matthews
Huntington McLane
Ansel Phelps
Mrs. Sheldon Prentice
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Donald B. Straus
Mrs. Edward F. Swift, Jr.
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John S. Wright

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Charles W. Allen
William Bayne
C. A. Beach
Wayne Bedore
Mrs. Hunter Berg
Mrs. Roland Bergh
Mrs. Charles S. Bird
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A Little Chance

TO HELP A LOT

Our privilege costs are rising. We do not wish to reduce nor cheapen privileges. Neither do we wish to increase the cost of annual membership. So many young student and scientist members cannot afford to pay more.

We know you want to help the Society; want a share of your fees to stand as a contribution towards the Society's work. Yet a little more inflation will wipe out the difference between static fees and rising privilege costs.

Our new CONTRIBUTING MEMBERSHIP at \$25 a year will help a lot towards solving this problem if enough generous members will transfer to this class. We are advised that this fee is deductible in figuring income tax.

A few hundred CONTRIBUTING MEMBERS will allow us to maintain and improve Society privileges without disturbing the present membership fee structure.

Membership Committee
NEW YORK ZOOLOGICAL SOCIETY

NOTE: Quite a number of our annual members have responded to this appeal, made originally in the March-April issue. To them go our thanks for their most welcome help.



ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

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“Once gone, they’re gone forever”

“ONCE GONE, THEY’RE GONE FOREVER.” This poignant statement applies directly to the relatively few remaining wilderness areas in our country and to the wildlife harbored by them. It is a truth that should be widely recognized in our country in the years that lie ahead. It needs no gift of prophecy to foresee that within the next decade an increasing number of reasons will be advanced to justify incursions of one kind or another into our existing protected national areas such as federal or state parks, national monuments and wildlife refuges. Even today a steady barrage is being fired to breach these precious places either for the timber they may contain, for the oil that may lie within them, or for the tapping of their water resources. The exploitation of these protected regions can find no justification, economic or otherwise. They represent at most but a fractional part of our total land area. There is not much sense in scraping the bottom of the barrel. In other words, we would do better to face the facts and make other readjustments in our national economy rather than to draw upon these final and ultimate reserves which, over and above any material uses, have immeasurable values.

It seems well that all who are interested in Conservation should be prepared for these inevitable pressures which are likely to increase within the next few years. A contributing factor will be the large and rapid increase in the population of our country that we seem to be facing. It now appears that we shall probably have at least another 20 million people in this country by 1960 — only 12 years away. At that time, with the inevitable spread of urbanization, our few remaining wildernesses will be more precious to us than ever.

Fairfield Osborn

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Long Distance



Mexicans were doing their own fishing in the Rio Moctezuma, although for food instead of science. The fish are guided by the zig-zag rock barriers into basket-like traps.

Photo by F. G. Wood, Jr.

ishing Trip

By JAMES W. ATZ

THE Zoological Society's Mexican Expedition has been making an eight thousand-mile fishing trip in the hope of establishing a rather abstruse genetical point. There were other reasons, too, but that was the principal one. Specifically, we wanted to learn what happens when a spotted platyfish from one river system is crossed with a platyfish of the identical species from another river system.

Maybe nothing happens except a swarming brood of healthy platyfish.

Or maybe something else happens and we learn a little more about the inheritance of cancer . . .

Three of us made the trip. Leading it was Dr. Myron Gordon, the Aquarium's Geneticist, and F. G. Wood, Jr., a young zoologist from Yale University, and myself accompanied him. Dr. Gordon has been working on the genetics of black cancers, or melanomas, in fish for more than twenty years.¹ His research has proved important enough that the National Cancer Institute has been financing it; a renewed, and larger, grant for that purpose was made available to the Society the first of last month. This work on the inheritance of cancer "is of particular interest," writes Dr. W. E. Heston, Principal Geneticist of the National Cancer Institute, "in that it appears to offer an approach to the study of the malignant change. The way is open for the identification of the specific genes affecting the malignant transformation."² Our trip

to Mexico was made to further that identification, to further the search for fundamental causes of cancer.

Even if you have thought much about cancer — and it's not a pleasant subject — you probably have not thought of it except in terms of human suffering. But other living things are afflicted with it, too — things as diverse as plants, flies and fishes. This is fortunate, for us, because we are thus enabled to study malignant growths in ways we never could with human beings. Since all cancerous growths may have characteristics in common and since the cancers of fishes and mice, for example, are almost identical with those in man, much of what is found out about the disease in lower animals can be applied towards the solution of our own problem.

Cancer, however, is no more frequent in lower animals than it is in man, and the scientist would be hard put to it if he had to wait until a lucky chance presented him with a cancerous specimen. Instead he has learned how to produce abnormal growths in experimental animals at will. One way is by establishing genetic strains of laboratory animals that are especially susceptible to cancer-inducing agents or that spontaneously develop neoplasms. Dr. Gordon has produced several such spontaneously cancerous strains of fishes.

A Japanese investigator once found only four melanomas or black cancers in more than 100,000 fishes he examined from the wild. Dr. Gordon has bred many hundreds of fishes with black cancers, and what is more, he can produce them in either sex, to the exclusion of the other, and

¹ From Quetzalcoatl to Cancer. *Bull. N. Y. Zool. Soc.*, 44 (3): 76-83, 1941.

² *Advances in Genetics*, 2, N. Y., 1948.

even place them on certain parts of his fishes' bodies, as he chooses.³ He does this by hybridizing them.

That is where the platyfishes and their close relatives, the swordtails, come in. These small, tropical fishes are found only in the fresh waters of Mexico, Guatemala and British Honduras, in many of the scores of streams, big and little, that pour down from the central Mexican plateau into the Atlantic. There are four different species of platies and three different species of swordtails. Some live hundreds of miles apart in widely separated rivers; others live side by side in the same streams and pools. In either case, they never

In brief, this is the valuable biological tool Dr. Gordon has fashioned and analyzed through crossing different species of fishes.

One of Dr. Gordon's most interesting discoveries was that the greater the difference between the spotted Common Platy and its mate, the quicker-appearing and more intense were the black cancers on their offspring. Crosses of spotted Common Platyfish with the three species of swordtails produced more diseased fish than those with the three other species of platyfishes; crosses with Couch's Platyfish from the Rio Grande (1,000 miles from the Common Platyfish's home waters) led to more cancerous off-



In two hours Dr. Gordon and his associates took 1,010 platies from this drainage ditch at Minatitlan in the state of Vera Cruz, the largest single haul of the trip. This is fishing station GAW 17.

Photo by F. G. Wood, Jr.

hybridize in nature. Thousands upon thousands of specimens have been carefully examined by Dr. Gordon and Dr. Carl L. Hubbs, our foremost fish taxonomist, and not a single hybrid has been discovered. In captivity, however, they can readily be made to cross. The hybrid offspring are fine-looking, vigorous fish, often larger and longer-lived than their parents — unless one of these was a Common Platyfish (*Platypoecilus maculatus*) bearing a *spotted* color pattern. Then the hybrids are excessively black, and as they grow older, many of them develop black cancers.

³ *The Biology of Melanomas*, N. Y. Acad. Sci., 1948.

spring than those with the Variatus Platyfish from the Panuco river system (only 200 miles away). Then the question naturally came up: would Common Platyfishes from different river systems show this same incompatibility when crossed? Perhaps the very beginnings of cancer-producing *genetic imbalance*, as Dr. Gordon puts it, could be detected in crosses between different geographical populations, or strains, of a single species.

That was what led to our expedition to southern Mexico early this spring.

In 1939 Dr. Gordon captured live Common

Platyfishes from Mexico's Rio Jamapa. Their descendants still live in some of the tanks devoted to maintaining pure cultures of various strains of fishes in the New York Aquarium's Genetics Laboratory at the American Museum of Natural History. To cross with them, Dr. Gordon needed Common Platyfish from one of the more southern rivers. The Rio Coatzacoalcos seemed to fill the bill. It was at least 200 miles away from the Jamapa, and moreover, no one had ever systematically collected fish in it, so a large number of preserved specimens from it were needed by Dr. Gordon to complete evolutionary studies correlated with cancer work.

muddy, noisome holes, but only secured slightly more than 100 platies and a similar number of swordtails. It was hard work getting even those few. Although these two species occur in a number of different kinds of streams and pools, they seem to prefer those spots that are hardest to collect in. Swordtails like small, jungle-covered streams, whose dark waters hide hundreds of snags that tear a seine and spoil a fisherman's disposition and whose rubbly beds and undercut banks ruin many a haul by providing numerous avenues of escape for trapped fishes. Platyfishes prefer stagnant lagunas or slow-moving rivulets whose waters are choked with aquatic plants out



Three platyfishes collected at station GAW 17 and shipped back alive to New York. The one at the bottom has a spotted dorsal fin pattern, which means that it will produce cancerous hybrids.

And so on February 16 we set out for the Isthmus of Tehuantepec and the Rio Coatzacoalcos, the River of Snakes. On our way south we stopped at Laredo and Mexico City only long enough to make necessary arrangements, and in Vera Cruz we put our automobile in storage, for there are no through highways on the Isthmus. Our first collecting point was Jesus Carranza, a small railroad town on the Rio Jaltepec, tributary to the Coatzacoalcos. Incidentally, "River of Snakes" is a misnomer; we saw very few.

Here we fished in eleven different localities, some of them pretty, jungle arroyos and others

of which the fish must almost literally be dug and whose soft, muddy bottoms make every step an exertion. At Jesus Carranza we collected far more mosquito, rotodore (black fly) and piñolia (baby tick) bites than we did fishes. While we toiled in the steaming sun, the Chachalacas seemed to mock us with their hysterical cries. These birds are similar to our own Road-runners, but they sound like chickens with nervous breakdowns and they are especially derisive when one is bending over an empty seine.

Our next stop was down-river at Minatitlan, where we were guests of Petroleos Mexicanos



Narrow jungle streams were often good hunting grounds for platyfish and swordtails, but they presented difficulties to the fishermen—snags and thick-growing water plants. Here Wood is seining alone.

which maintains a large modern refinery there. The people of Pemex were most generous with their facilities and had much to do with making our expedition a success.

Dr. Gordon figured that Minatitlan should be right in the heart of platyfish country. This was his fourth trip to Mexico in search of platies and he has seen more of them in their native habitat than any other man. Simply by looking at a body of water he can usually tell whether the fish he wants are in it. We wanted to find a place with hundreds, not scores, of Common Platyfish, however. That was why we went to Mexico during the dry season. Towards the end of that time, the waters of the land become concentrated into a few areas. What were once raging rivers become quiet streams, with shallow side-pools, and what were once great sprawling lagunas shrink to small ponds and mud-holes. Along with the concentration of water goes a concentration of the fishes living in it. Whereas a good seine-haul in the wet season might yield a dozen fish, in the dry season hundreds can be taken with one sweep.

Back in 1939 Dr. Gordon hit a “platyfish jackpot,” getting more than 4,000 at one spot in a few days. We had no such luck on this trip, but just outside of Minatitlan we discovered a series of small drainage ditches that provided us with our largest single collection of the whole expedition. Station GAW No. 17, as it came to be designated in our Field Book (GAW being the initial letters of Gordon, Atz and Wood) did not appear to be promising at first. True, there were a couple of platies in the net after most of our hauls, but there were many more Common Mollies, Mexican Mosquito Fish and Sardinas (*Astyanax*). We were always interested to learn just what piscine neighbors our platies associated with, but often wished they were not so numerous. A netful of ubiquitous Mollies can sometimes be more annoying than no fish at all, when you’re platy-bound and not having much success. For although platyfishes and swordtails are widespread, they are not numerous save in those relatively few places specially suited to them.

While Wood and I fished, Dr. Gordon explored. Soon he called to us, “Here’s a spot we

ought to try. Let's bring the seine up here." Superficially the ditch where he stood seemed identical to the one in which we were now fishing; in fact, it *was* the same channel, just a few hundred feet upcurrent. Closer examination, however, showed that it was slightly narrower, had higher banks, a muddy instead of sandy bed and, most important, some aquatic plants, principally Moneywort, growing along either side. Such differences can "make all the difference."

Wood and I moved in and started to seine. A seine is basically an oblong fishnet with two vertical poles at the ends, but manipulating this simple contraption can be quite a complicated affair. Different techniques must be employed under different circumstances. Here, one of us placed his pole as close to one of the banks as possible and with his free hand grabbed the net by the lower edge and held it firmly against the bottom and side of the ditch. The other seiner placed his pole slightly upstream, leaving a pocket in the net that billowed out slightly behind his partner. As we both moved upstream, the man by the bank dragged the seine right through the submerged plants, uprooting them or thoroughly "combing them out." After moving about six feet, the upstream fisherman swung the seine around to the bank to join his partner and then both of us lifted the net simultaneously, being careful always to keep it tight against the bank.

Dr. Gordon's expert eye for platyfish hideouts had not failed him. We soon had hundreds of


specimens. Thirty of the best were set aside to be shipped alive to the Genetics Laboratory; the remainder went into preserving bottles for future study. We fished this 120-foot stretch of small drainage ditch steadily for two hours — until we caught no more fishes in it — and came up with a total of 1,010 Common Platyfish. Above and below this spot they were scarce. This was the location they preferred to any other, and here there were more of them than of any other species.

If any single Station could be said to have "made" our expedition, GAW No. 17 was it. Having taken that collection, we had accomplished our minimum requirements in the field and all subsequent achievements could be considered as "gravy." The task of getting the living fish back to the Laboratory, remained, of course. From Minatitlan they were shipped by air express to Mexico City, where they were rested and cared for by Sr. Jorge Delaye, the leading fish fancier of that city and a good friend of Dr. Gordon. Later we sent these Coatzacoalcos Platyfish on to New York by air, and they are now being crossed with their more northern relatives from the Jamapa. It may be many months before the first reports about the effect of hybridizing fish from different river systems can be made, but all along the way Dr. Gordon will be learning more about the theoretical basis of cancer. Through his technical publications, that knowledge will be incorporated into the ever-growing body of knowledge about the disease.

Dry weather creates shrunken pools like this one, which held two swordtail species and one kind of platyfish. They hybridize readily when kept in the laboratory but never in the wild.

Photo by F. G. Wood, Jr.





Safari to Carolina

By **BRAYTON EDDY**

THE place was said to be “reeking with rattlers.” We knew it was true because we had visited this particular spot in South Carolina the previous year. Not only were there rattlesnakes in abundance, but likewise there was an amazing assortment of other reptiles, amphibians and insects geared to our particular interest. For this was a zoological transition zone where north meets south and species typical of both regions overlap.

It was a land of pine ridges and shallow swamps, of yellow jasmine and turkey buzzards. The time was early March, 1948.

On our first visit a year ago we had been skeptical of reports. Reptiles were not likely to remain plentiful, it seemed, on a 45,000-acre tract where underbrush had been burned over each spring for quail shooting and where for fifty years a vigorous “vermin” campaign had resulted in the killing of thousands of serpents. Yet here they were and no mistake. It had gotten so bad that many members of the resident hunt club refused to go out any more. They were scared.

But such a place was grist for our mill. We needed live specimens for our Reptile House and for trading with other zoos. It was my job to bag them. Sam Dunton, Staff Photographer, was along to get pictures. Any spare time during the allotted three weeks was for making original observations.

We were fortunate in having a pick-up truck provided for carrying our specimens back to camp

and in having saddle horses for the actual hunt. Some spotting of snake holes had been done previous to our arrival by natives of the region, who later accompanied us on the field trips to "watch the fun."

"Snake!" someone would yell, which was my signal to dismount and prepare for action. If it was a rattlesnake, a meal sack was tied to a nearby tree and a man with a long-handled shovel was assigned to hold it open.

Cautiously I approached with a five-foot pole terminating in an iron hook. The trick was to slip the hook under the midriff, raise the venomous creature off the ground in balance and cause it to dive head first into the bag. Sometimes the snake would coil and make the task comparatively simple; but again it would dart in almost any direction, when some fancy action with the snake stick was necessary to prevent its escape down a hole. Rarely did it come in my direction. Once in the bag, a piece of twine tied about the top kept it confined.

On sunny days, of which there were only four, rattlesnakes were found on pine ridges close to their holes. The lowlands were flooded from incessant rains and even the holes were half filled with water. Actually they were shelters under the roots of pine trees lifted by a former hurricane. The snakes could dive into them and come up for air under the trunks. It was useless to probe a hole even partially covered by a spider's web or where the earth was not firmly packed. Such a hole would not be productive.

When a likely spot was discovered, we probed it with a long stick. Sometimes a rattling noise was heard or a triangular head poked itself out of the water. If the snake could not be reached with the hook, a side tunnel was dug until coils of the body were exposed. Most rattlesnakes taken in this way were either large Eastern Diamond Rattlers or Canebrake Rattlers. The Carolina Pigmy Rattlers were caught in the open or taken from behind the loose bark of pine stumps.

Cotton-mouth Moccasins were the most difficult poisonous serpents to capture with an ordinary snake stick. Invariably they stretched out on the edge of an embankment, under a briar brush, or beside a floodgate where they could easily slither into the water. Their brown bodies render them hard to see, and they rarely wait to



determine what you want before making a noiseless getaway. If you do succeed in getting between them and the water, and they feel themselves cornered, they will stiffen their bodies and tumble off the hook. For this reason I prefer to use a grab stick made of an old T-model Ford emergency handle. By pressing a lever at one end, a pair of pincers goes to work at the other.

Non-poisonous snakes were caught with bare hands. It is the surest method and least likely to cause snake injury. You may be harmlessly bitten unless you grab close to the head, and because snake saliva delays coagulation considerable bleeding may result, but it's worth it. Coachwhip Snakes, Black Racers and yellow Chicken Snakes are particularly quick to bite.

Coachwhip Snakes are also very fast. They can almost outdistance a man. Extremely nervous, they are quick to size up a situation and dodge into the nearest brush pile. With their black head and neck raised in flight, it is extremely difficult to follow their slim brown bodies as they glide along the ground. They can also take to low bushes or the bottom limbs of young trees. One specimen was over six feet long.

Cotton-mouth Moccasins were hard to capture when they took refuge under a briar bush or beside the water. Out in the open it was easier, as Mr. Eddy is demonstrating here.

In the cool morning hours young Corn Snakes, Chicken Snakes, Milk Snakes and Black Racers were commonly found behind loose pine bark. Southern Ribbon Snakes like to sun themselves on briar bushes. So do Chain King Snakes; and should a small rodent pass on the ground below, they will drop and wrap it up for dinner.

Four-lined Chicken Snakes on warm days often take a siesta on the lower branch of a chinaberry shrub. Both Northern and Southern Hog-nosed Snakes and Southern Pine Snakes were noted hunting toads and rats along the ground. One of the former species was as black as a charred stump — a melanistic phase. DeKay's Snakes were discovered under fallen logs and one 10-inch Southern Ground Snake had hidden itself in a dangling rope of Spanish moss.

When it rained, as it did for eight days on location, or when the temperature was too low for reptile navigation, we barked trees for lizards and invertebrates. By suddenly stripping the loose outer covering from dead pines, we were able to grab Blue-tail Lizards, Brown Skinks, Fence Lizards, American Chameleons and centipedes before they realized what had happened. One Greater Five-lined Skink and several Southern Toads were likewise caught in this fashion.

One day we noted a wild commotion on the trunk of a giant live oak. Around and around the object circled, until at last it ended up close to





the ground. Three young gray squirrels had gotten their tails entangled in Spanish moss, supposedly from their nest, and were trying desperately to disengage themselves. One squirrel was already dead from fighting, and we were obliged to shoot the other two. It reminded us of a Snowy Egret which had met a tragic death the day before. On coming in for a landing beside its clutch of eggs, its long neck had become twisted around a projecting willow branch and there it hung — dead.

On starting for home upon a deserted highway, we encountered four turkey buzzards sparing for a cat run over the night before. One buzzard pecked at the head while the others sought to make off with the hind quarters. But each attack was driven off by the head-eater, which raised its wings threateningly and jabbed with its sharp

Reverse collecting — Curator Eddy liberating seventeen Cumberland and Florida Terrapins in a South Carolina swamp. They were surplus stock that had accumulated at the Bronx Zoo.

beak. First come, first served seemed to be the prevailing urge; but unfortunately we could not stay to watch the outcome.

We had made our bag. There were 83 snakes of 16 species, 23 lizards of 4 species, 3 amphibians of 2 species and innumerable invertebrates of 6 species. Some are now residing in the Zoological Park, while others have been traded to Copenhagen, Washington, Chicago, Portland, St. Louis and Prague. With numerous colored slides, black-and-white photographs, and original observations added to our collection — it would seem as if our safari was a success.

May Morning on an Expedition

By WILLIAM BEEBE

THE MORE VIVID and absorbing an experience, the greater the difficulty of putting it into words for other persons. The facts of history are more palatable when hung on definite dates: the Fourth of July, the Eighth of November (the official opening of the Zoological Park, in case you have forgotten!). So perhaps a few of the many happenings of part of a single day in the jungle may make our interests and activities more real.

THE MORNING OF MAY THE FOURTH, 1948.

3:00 A.M. — Awakened by the welcome drumming of heavy rain. Perhaps the weeks of delay are over, and the tropical spring is here.

5:00 A. M. — Reawakened by the terrific roaring of a band of golden howling monkeys, who seem to agree with me about the possibility of spring. They roar for an hour, from the jungle almost overhanging Rancho Grande, and again I take careful notes of their voices. Again the decided difference is apparent between the howlers here and those of Kartabo, five hundred miles to the east. These, except for occasional falsetto, utter dominantly the jaguar-like roaring; those of Guiana are always varied, with a great deal of sealion-like bubbling and gargling. No two Chinese dialects could differ more. As specific criteria, psychological and vocal distinctions, such as these, will come in time to be as important as physical differences.

This, the most awesome of all jungle sounds, may never be heard in our Zoo, for howlers, both babies and adults, mope and die in a few days or weeks. Yet the little chaps are most affectionate and eat freely. Someday we will send Len Goss

to the jungle to veterinize a baby golden howling monkey and bring it back in perfect health. It will be an exhibit as rare as a Yapock or Afropavo.

At 6:30 while finishing breakfast, a sharp *ki-ki-ki* sends me headlong to the giant binoculars, already focussed through the open window on the topmost stub of a candela tree, one hundred feet above the ground. On it, one hundred yards from my eye, is a male Bat Falcon, nine inches of fierce hawk, holding in his talons a second prey of the day, three inches of glittering green hummingbird. I record its name, after reference to the skins behind me (*Chlorostilbon prasinus caribaeus*) male, as certainly as if the little bird was in my hand. The female falcon swoops into my field of vision, takes the bird from his claws and devours every part, even beak and feathers. She had already, as I saw from my bedroom window, fed her two chicks a bat, so she deserves this meal for herself. This is the third month of watching the inception and development of all the varied instincts of the parents and young of these splendid birds.

At 7 o'clock we leave the laboratory and under the windows I pick up two dead birds. One is our familiar northern Redstart, which, had it not been for the hypnotic power of our electric lights, would now be far on her way to our Zoo, or Vermont or Canada. The other bird is a plump Ruddy Quail Dove. Besides Venezuela, this bird breeds in Cuba, and this is doubtless a migrant to its insular home, though no such habit has ever been suspected.

We walk on toward the howlers' tree and find the jungle vocal with new sounds, all having something to do with spring. Tinamou are call-

ing from the distant valley and close at hand a male curassow begins his courtship in a voice so bass and deep that it is near our lowest register; *oom! oom! oom-oom!* (with mouth closed), as very rarely I have heard them in the Zoo. Only in the Zoo have I ever seen the bird loudly clicking a pebble in his beak as he *ooms*.

As vivid to our nostrils as are the sights and sounds to their respective organs of sense, come the scents which fill the cool, humid jungle air. With a sudden shock we abruptly enter a zone of solid sweetness, and only our glasses reveal the newly-opened masses of orchids among the air-plants high overhead. Then we encounter a sharp, whiplash of musky odor, marking the path, like smoke-writing, where some insect has recently flown past.

FROM 9 o'clock, for an hour, I watch the cacique colony, just beyond the howlers, and record a new phase of oriole behavior. A female, whose nest had blown down, is in the act of beginning a new one. A second great, swinging, woven structure three feet in length is no light undertaking, and in her haste, she is led into crime. In this species there is never any mutual assistance, except attack upon a common enemy, but always there is a friendly tolerance and complete respect of one another's homes. We watch this bird steal building material right and left from her sisters' nests, but soon she gets careless, is caught in the act and chased angrily by the owner. As it turned out this unique psychological trait was to last only three days, when, for some unknown reason, she would again depend upon her own efforts, finding her own fibers and vines in the adjacent jungle. Her victims showed no memory of her delinquency. It was a temporary deviation from the normal, which, if it became general, would soon disrupt the whole colony. Only patient and consecutive observation on our part would ever have revealed such unsuspected behavioristic lapses, interesting individual deviations from the pattern of instinct. As in other creatures inhabiting the earth, not unrelated to ourselves, such peccadillos become criminal only when the author is caught in the act.

The next turn in the road beyond the cacique colony we have named Atta Curve because it is the site of an enormous nest of leaf-cutting atta

ants. At 10:30 I stop here and see at once that spring has come also to Solomon's ideals of wisdom. Last night hundreds of kings and queens, alias the winged sexes, came to the surface of the nest and flew away on their nuptial flight. Four more giant queens are now, before me, being groomed for their flight, and the sight arouses equal emotions of amusement and pity.

It is impossible to watch without thinking of a giant plane being readied for some important mission. Yet we, who look down as gods might oversee human activities, are aware that something is very wrong. Every member of this delayed squadron of departing queens has some serious defect; one has a dent in her body armor, another a twisted wing, and so on. But the workers do not know this.

We watch one enormous queen as her attendants literally drag her out of the nest entrance, on to a bit of level ground, a cleared formicine runway. As far as size goes, the worker ants helping her are like a pack of fox terriers around an elephant. Eighteen form this devoted ground crew, and they are all over her. Three tug at her antennae as she walks along with a slow and wavering gait. Others crawl over her great wing expanse and rounded body, cleaning and scraping off every particle of dirt. She has been reared in a special chamber, fed on very special diet; this is the climax of her life.

Suddenly she lifts her wings and gives them a preliminary flutter. Eight workmen mechanics are hurled to the ground, but instantly are back, frantically inspecting every leg joint, every segment. The wings vibrate in high gear and off she goes, two, four, six feet into the air. One over-enthusiastic helper failed to jump in time and I can see him, in midair, clinging to one of her legs. She circles once with a lumbering flight, then crashes headlong, falling directly into the center of a wide atta trail. It is filled with a busy throng, scores of ants going out empty-jawed, many returning with their banner-like bits of green leaves. Her descent causes commotion, but attracts no lingering interest. There are no kibitzers among the attas. These have their own definite job in life, wholly unconcerned with any royal take-offs.

The lone mechanic hitch-hiker wanders about aimlessly; the queen rests motionless with droop-

ing antennae. Her life's chance is gone, and here I leave her. Even if we describe this happening in the most technical language, it is sheer tragedy.

At about 11 o'clock I reach Portachuelo Pass, two hundred yards from the laboratory, and find Henry Fleming back from a trip up Pico Paraiso, now on watch at the head of the gorge. Two butterflies have flown up this pathway in the last hour, and as I arrive a third is caught. Except for our records of two years ago, this would be nothing but the most trivial occurrence, with no significance. But we know that this trio is the advance scouts, which in the weeks to come will swell to millions upon millions, and unbelievable numbers of species of butterflies and other insects. This year we hope, as a major achievement, to solve the cause of this wholesale migration of astronomical numbers of Venezuelan insect life. If we succeed, the results will be applicable to similar but much lesser movements in our own and other countries.

We think back to the dead Redstart we have just picked up, and we know that last night, in the rain and cold wind, thousands of our northern birds battled their way northward through this very pass, on their migration across the terrible fifteen hundred miles of open Caribbean Sea.

The origin and the reasons of these aspects of animal behavior are at present beyond human comprehension.

A call comes to us and a few yards along Hummingbird Trail we come upon Laura Schlager practically prone upon the jungle floor, with a finished water-color painting equally flat in front of her. It is one of a series of Jungle Fragments which, I think, will be a new and exceedingly striking feature of the next Annual Meeting of the Zoological Society.

We walk on, and the Chief Forester of the Government passes in his car and stops to tell of the jaguar he almost ran down after he left us last evening. We are amazed anew at the juxtaposition of automobiles, cement highway and "tigres" in this National Park among the Venezuelan Andes.

As we turn to go back, we see Jocelyn Crane in the distance with her factotum and official tree-climber, Antonio. After two hours in the jungle, both are laden with great blossoming arums and other air-plants with their insect visitors, besides vials of jumping spiders. All we can hope is that we have discovered and interpreted correctly a few hints of the behavior of our jungle neighbors.

Report from the Congo

AS WE PROMISED in our Belgian Congo Expedition Newsletter No. 8, we intend to keep our membership informed about the expedition through ANIMAL KINGDOM. Here is a summary of the latest news received from Charles Cordier, our animal collector.

About the middle of June he moved his base camp from Bongena, 40 miles east of Stanleyville, to a native village called Kisubi about 6 miles out of Stanleyville on the road to Opala. This change of location was necessary because of the difficulty in getting supplies from Stanleyville

during the days or even weeks when Charles would be away from camp.

Kisubi is on the opposite side of the Congo River from Stanleyville, but ferries run every half-hour and a houseboy on a bicycle can make daily trips to Stan, if necessary, for eggs and meat and fresh vegetables to feed our animals.

"Ever since our arrival 5 to 7 prisoners, among them one woman, have been weeding and cleaning up around the place, while 28 to 34 men on orders from the State have busied themselves with putting up a cook shed, boys' quarters, a

small bird and mammal house and 8 pens, partly roofed over, which can be serviced from a central corridor," Charles writes. "Four of the prisoners who did the weeding were tied to each other by the neck with a length of rope.

"The moving from Bongena to Kisubi was done on one single, enormous truck without side stakes or anything except a platform about 30 feet long. I piled the seat high with sticks and about 60 big bundles of roofing leaves, and on top of these the cages with our birds and small mammals. Right behind the cab I placed the icebox and the big heavy cases, one of which houses the Giant Pangolin. After that came all the packing cases, and our own luggage. In the end it was a monster of a load.

"After a short run some of the bottom load shifted to one side and we could only proceed

very slowly. It was so bad I practically shrank from leaning out of the cab window for fear of upsetting everything. The crossing of the Congo by ferry had our hearts pounding but things went off fine.

"As for our jeep, it was chock-full of our boys and their belongings — kettles, pans and lanterns. More of the help was perched on top of the big load and our billy goat, which we keep as a reserve meat supply, topped off everything."

Charles mentioned his injured leg only briefly; apparently it is continuing to improve, for he is able to drive the jeep and his letters are full of plans for striking off to the northeast part of the Congo after large mammals. He has specimens of the rare Potamogale or Water Shrew which no one has yet exhibited, and his large Elephant Shrews are thriving.



At the very beginning of his collecting expedition in the Congo, Charles Cordier found this hunting camp in the jungle in the region around Opala, and from the hunters (who are here preparing to smoke-cure an antelope) learned that this is good Congo Peacock territory.



8:00 *Keeper Blair's busy morning begins with the unlocking of the Platypusary, A.M. changing the signs, rolling up the curtains and removing protective screens.*

KEEPER JOHN BLAIR takes care of only three animals. Other Keepers have to feed, water and clean up after anything from a dozen to hundreds. You might think every other Keeper was passing the word around that if there's an opening in Johnny Blair's job, they'll take it.

But they aren't. Keeper Blair happens to be "The Platypus Man" and three Duck-billed Platypuses are the equivalent, in time-consuming care, of any thirty other animals. They're a full-time job.

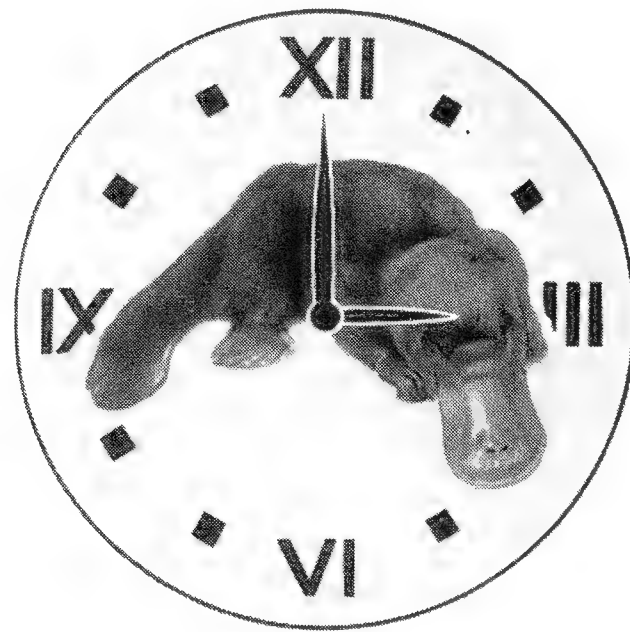
The pictures on pages 112-115 don't begin to tell the full story of The Platypus Man's day, but they do pick out a few highlights. One picture that's typical, but which we couldn't get, would show Keeper Blair, flashlight in hand, at

work in the Platypusary late at night. Every evening after dinner he sits down quietly and thinks back over the day, remembering the behavior of his three little animals, thinking step by step of his duties around them. Sometimes he can't be sure of some point — whether he snapped a certain lock, cleaned the dry grass out of a certain elbow in the sleeping tunnels. So he gets his flashlight and trudges over to the Zoo. Always he finds everything in apple-pie order — but he can sleep better that way.

Keeper Blair has been working for the Zoological Society since 1934, first at the old Aquarium and then, since 1941, at the Zoo. He has had charge successively of the Penguins, the Giant Panda and now the Duck-billed Platypuses.



Around the Clock



with the Platypus Man

8:30
A.M.

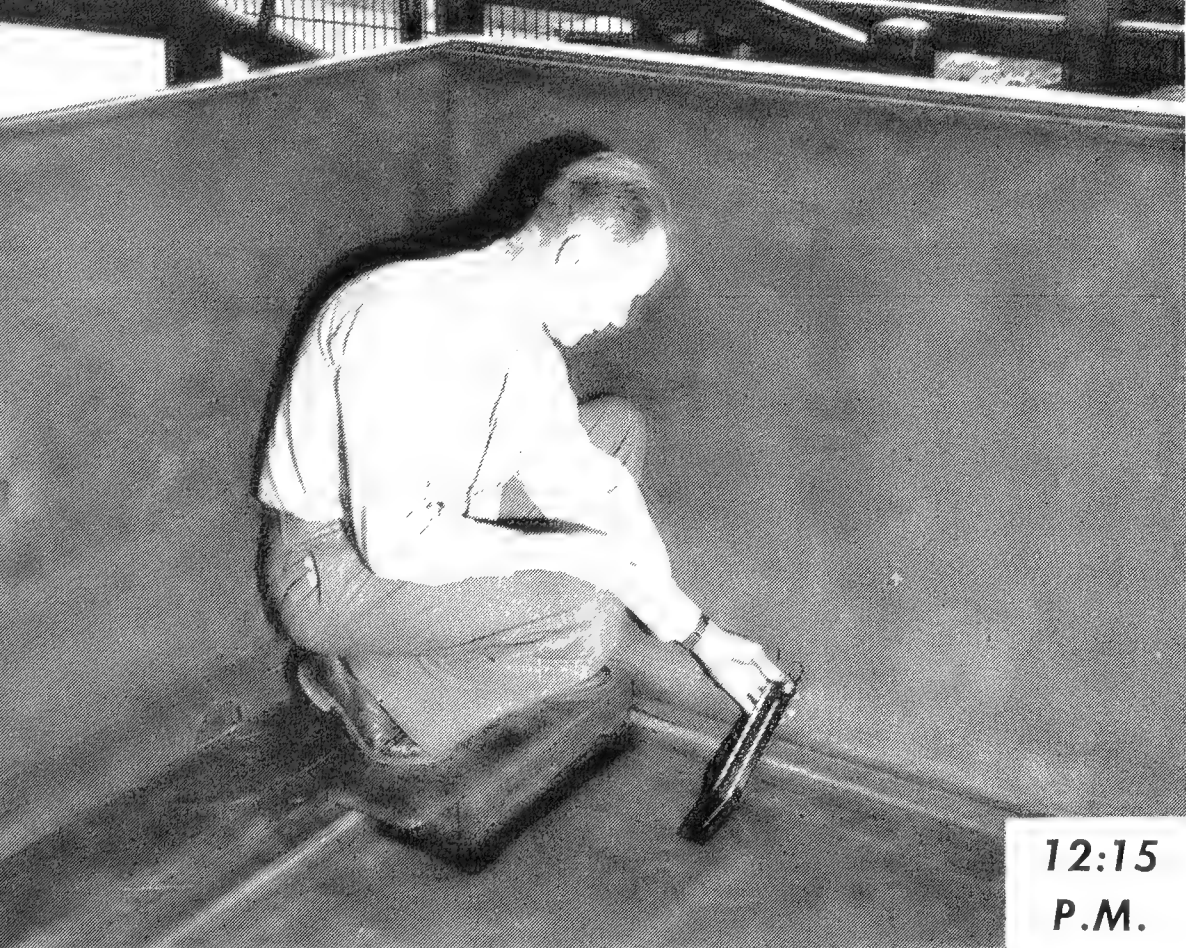
*Now cleaning begins in earnest.
The Platypus swimming pool is
scrubbed, left-over food collected.*



9:45
A.M.

*Mealworms and frogs are issued
from supplies at the Reptile House,
to be used at the afternoon feeding.*





12:15
P.M.



2:30
P.M.



10:45
A.M.

10:45 A.M. Egg custard is a favorite Platypus food and the Keeper makes a fresh supply every day. It supplements the animals' main diet of earthworms, mealworms and crayfish.

12:15 P.M. It is time for the Platypus Man to test the temperature of the water in the swimming pool and to make necessary adjustments if it varies greatly from 65-70 degrees.

2:30 P.M. By this time, half an hour before the opening of the Platypus showing, crowds are already waiting, getting change for the 5-cent fee that helps pay the cost of food.

2:45 P.M. Cecil, the male, is exhibited one day, Betty and Penelope the next. They must be lifted out of their straw-filled sleeping burrows and placed carefully in the water.

2:55 P.M. A recording telling visitors about the home, haunts and habits of the Platypus is played over the public address system as the gates are about to open to the visitors.



Spare
Time

4:30
P.M.





2:45
P.M.



2:55
P.M.

3:00 P.M. The Platypus exhibit is open—and a junior miss under the age of five is first under the turnstile, for small children are admitted without payment of the 5-cent fee.

3:30 P.M. Fascinated by the underwater movements of the Platypuses, visitors line the wall of the swimming pool and watch as the little animals cruise in search of crayfish.

4:10 P.M. One hour is about as long as the Platypuses like to stay out during the afternoon (they normally feed at night) and the last visitors leave a few minutes after 4 P.M.

4:30 P.M. Within a few minutes the screens are placed over the pool, the Platypusary is closed for the day, and the Platypuses are free to come and go, to feed and sleep.

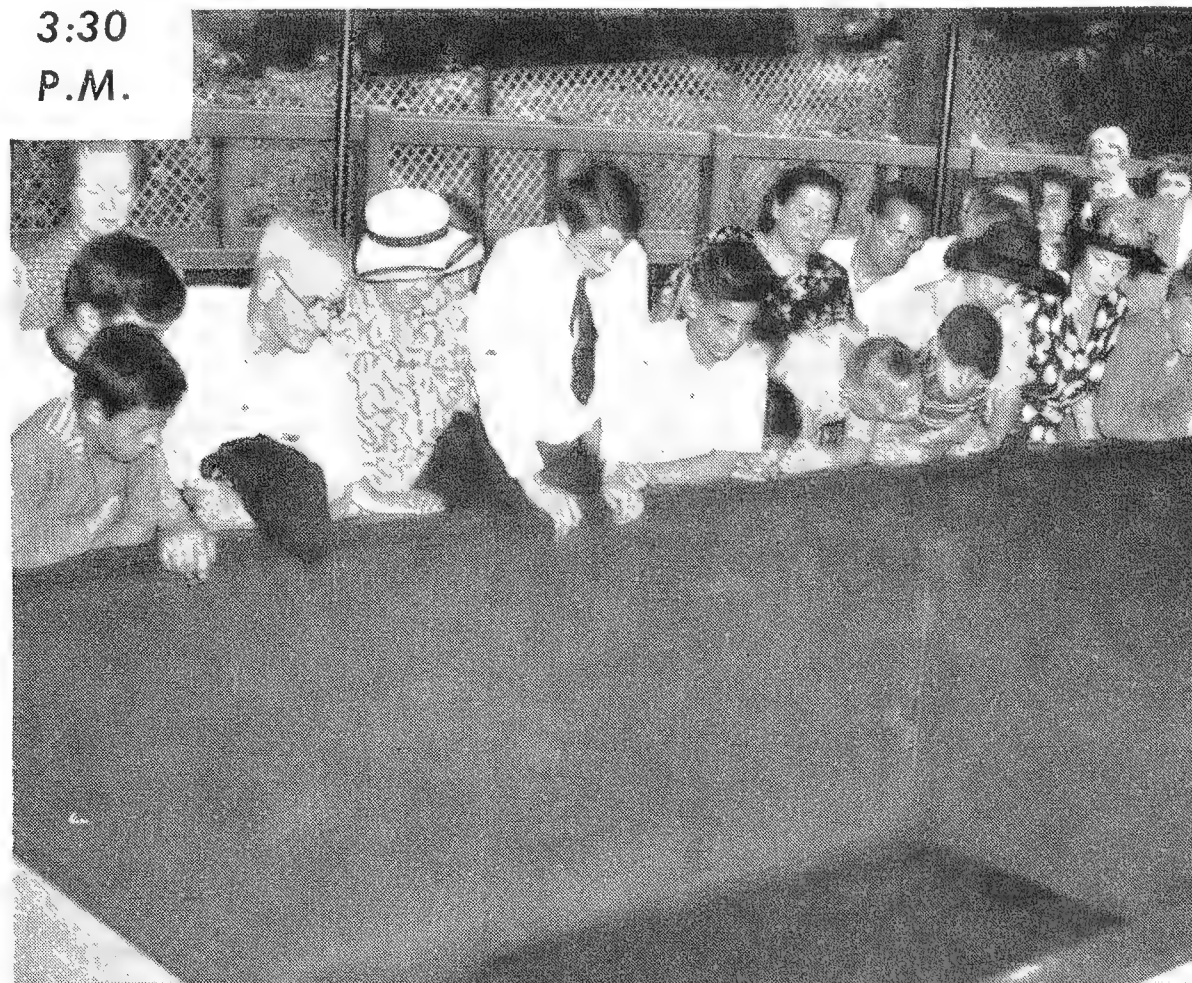
SPARE TIME. When evening comes, Keeper Blair still thinks about Platypuses and in recent months he has taken up the hobby of modelling in clay—a Platypus, of course!



3:00
P.M.



4:10
P.M.



3:30
P.M.

Pre-view at Bimini

By ROSS F. NIGRELLI

THE ISLAND of Bimini is a five-mile-long sliver of coral sand and limestone, palm-fringed and periodically hurricane-swept, at the edge of the Gulf Stream just sixty miles due east of Miami. Its blue-green waters abound with a rainbow of tropical fish and some of those fish might abound with parasites.

Hence the New York Aquarium's interest in Bimini — for when the time comes when we can again exhibit a great collection of marine organisms we expect that many of them will come from the waters around this tiny island. It is important to know well in advance what sea creatures are available and how they can be caught and shipped. Still more importantly, we must know what diseases to expect and how they can be eliminated.

At one time Bimini had a certain importance — or notoriety — as a center of rum-runner activities. Its importance today and in the future is likely to be connected with the Lerner Marine Laboratory of the American Museum of Natural History which Mr. Michael Lerner established in 1947 to further field studies in marine biology through the Museum's Department of Fishes and Aquatic Biology. The laboratory occupies about two and a third acres fronting on both the ocean and the harbor sides (for Bimini is only about a quarter of a mile wide), and there are complete facilities for students — including a series of ocean "corrals" for big fish. The laboratory was my headquarters during the six weeks I spent on the island this spring.

More than fifty years ago "three students," as

the *Scientific Monthly* called them, went to Bimini to explore its marine resources for the light they might cast upon the Darwinian theories. They were students later to become famous: E. A. Andrews, the marine biologist; T. H. Morgan, the Nobel prizewinner in genetics; and R. P. Bigelow, now one of our great ichthyologists. Thanks to them, we have a good idea of the wealth of sea life around Bimini half a century ago, and it was pleasing to discover that Bimini is still unspoiled. *Cassiopeia*, the jellyfish, awaiting its small-fish prey, still sits upsidedown in the quiet lagoons fringed by mangroves. Around Stokes Cay the shallow waters are brilliant with living (and bad-smelling) sponges. Blue-and-yellow Beau Gregor's slip in and out of their gaping pores. White and pink anemones sway to the slightest movement of the water as if to reach for and snatch a passing shrimp. The naked, olive-colored, mottled gastropods known as Sea-pigeons lie inert in the lee of the island ready to shoot out their purple ink when an inquisitive biologist disturbs them.

An occasional octopus may be seen flowing between the coral shelves. The tube-dwelling, dark red serpulid worms with their constantly moving fringed gills, retract into their elongated homes (attached to dead shells) at the slightest stimulus.

Small red crabs, camouflaged by bonnets of red sponge that they shape with their own claws to whatever millinery fashion has come down through the ages, remain inert that they may not be noticed. The marine banks are still well popu-

lated with *Oreaster*, the giant starfish, with brittle stars and sea urchins (some poisonous, some not). Sea cucumbers abound and make a home for the purplish pearl-fishes that take refuge in the cucumber's intestine.

I was fascinated by the tiny mounds of white sand that betrayed the presence of acorn worms, for Andrews, Bigelow and Morgan had sought this curious creature on Bimini and had managed to secure only half a worm; I would, I hoped, do better. (I might as well say right here that I didn't; I did not get even half an acorn worm).

These primitive worms have a supporting rod or notochord running down their backs, and at the same time possess gill-slits like fishes. A big one reaches a length of nearly ten inches. Disturbed, it gives off a strong bromine odor. These are the most primitive chordates or backboned animals and their larvae are strikingly similar to the young of the echinoderms. Some biologists favor the idea that our very, *very* remote ancestors were starfish-like animals—and thus the acorn worm with its starfish-like progeny is possibly vaguely and a long way off related to us.

I wanted one and dug hard and often in the sand, but the worm was quicker than the shovel and I never even caught sight of a wriggling "tail" disappearing in the watery sand. Nothing short of a power-driven scoop would be fast enough to capture them, it seems.

When the sea-scented darkness falls, Bimini's flats still glow with the flickering lights of myriad luminescent organisms. Millions, billions perhaps, of fire worms burst into blue cold light each mating season at the moment of fertilization.

There is no doubt about it; Bimini today is the Bimini of old, a happy hunting ground for the marine biologist.

The day after my arrival, having explored and marvelled at the wealth of material, I went to work. Clarence and Pedro, my two helpers, collected giant conchs for bait (and for table use, for these great gastropods are delicious eating), and then they set the live-traps a few yards off the laboratory dock. I wanted to see what fish we might easily take for Aquarium purposes.

I saw, and quickly. After a few hours the traps were swarming with brilliant marine tropical



American Museum of Natural History Photo

Offshore from the Lerner Marine Laboratory, in the shallow and crystal-clear waters, are live-pens for such large marine creatures as porpoises and dolphins, barracudas and groupers.

species that will be standard items for our exhibition tanks. There were blue angelfish, triggerfish, tangs, sergeant majors, grunts, cowfish, trunkfish, four-eyed, banded and common butterflyfish, Nassau groupers, black angelfish, French angelfish, multicolored parrot fishes and — prize catch of them all — rock beauties with large splotches of blue-black on the sides and red fins orange-fringed.

What an exhibition those trap-fuls would make in the new Aquarium!

It happens that these particular fishes are most susceptible to the parasites that used to give us so much trouble at the old Aquarium in Battery Park. One monogenetic fluke called *Benedenia* (*Epibdella*) *melleni* gets on the eyes and skin of fishes. Living conditions for fishes are apt to be a little crowded in an aquarium and a *Benedenia* infestation can reach epidemic proportions and quickly wipe out an entire collection. If the Bimini parasite population was extremely heavy, difficulties might arise later when Bimini fish come to New York. So I tested the catch, dipping the fish in fresh water. This causes the external parasites to drop off. A whole series of dippings showed that most fishes were free of infection and that the others were only mildly parasitized. So that is one worry the less about Bimini fish. Nevertheless I continued with a systematic survey of the fishes of the area, learning more about their habits, susceptibility to parasites and diseases, methods of control and treatment, all in preparation for the day when we should make our first collection for exhibition purposes. The Bimini waters were surprisingly free from parasites and diseases.

All fishes naturally harbor one or more kinds of parasites, but fortunately not all of them are trouble-making. I was interested in making as complete a collection as possible of these disease-producing organisms, both internal and external. Bimini is a big game fish paradise and whenever a sportsman brought a 500-pound tuna to the dock I was generally on hand for the weighing-in ceremonies. After the weighing and photographing, I went over every fish with a fine-tooth comb, examining skin, eyes, gills, stomach, intestine and other internal organs for parasites. My treasures of little white parasites are now neatly labelled and bottled and catalogued.

Especially did I want to get a look at a freshly-caught marlin and through the kindness of Mr. Axel Wickfeld of Palm Beach I was invited to go out on Captain Eddie Moore's fishing boat. We had hardly cleared the bank at South Bimini and set out the bonefish bait from the outrigger when a blue marlin struck. Mr. Wickfeld jumped into the swivel chair and inside of three or four minutes he had the leader line alongside the boat, the strike boys had the fish gaffed and landed. It was a small marlin, only about 220 pounds in weight.

Two small sucker fish dropped off immediately. As the fish reached the deck I noticed that it was heavily parasitized with copepods, some of which were buried deep in the flesh. I scraped the smaller red and blue parasites off the skin and into a bottle of preserving fluid. Mr. Wickfeld watched me in fascination; he had never noticed such parasites before — and I must say that this particular specimen was unusually heavily infected. I explained that the long, almost worm-like copepods were buried in the flesh and were sucking blood from the arteries. Curious to see them, he asked me to cut into the fish.

That was too much for Captain Eddie. A fishing boat captain's reputation depends upon the total catch of his boat, and under the rules of big game fishing a fish that has had a chunk taken out by a shark or the ship's propeller is disqualified. My dissection would mar the marlin and even though it was a small one, it counted toward the total catch — if it was brought to the dock unscarred. But Mr. Wickfeld had become infected by the bug of scientific curiosity and he talked the captain down. I made a careful incision, cutting out a small wedge of flesh to disclose and remove an enormous copepod.

Sure enough, when the *Panda* (our fishing boat) reached the dock, other captains inspected the catch, noticed the hole in the marlin, and offered their condolences to Mr. Wickfeld and Captain Eddie.

I am glad to say, though, that the tournament judges took a more enlightened view of the matter and agreed to count the marlin to Mr. Wickfeld's and Captain Eddie's credit when I showed them, by slipping the wedge of flesh in and out, that it was I, and not a shark, that had mutilated the fish. And Mr. Wickfeld won the tournament.

Bringing You Up to Date on the Conservation Foundation

By DONALD T. CARLISLE

SO MUCH HAS BEEN HAPPENING — and so fast — that we have not had an opportunity to give the membership of the Zoological Society a comprehensive report on the events set in motion by the creation of the Conservation Foundation, which was incorporated under the laws of the State of New York on March 30, 1948, with the sponsorship of the Zoological Society.

This is an attempt to bring our membership up to date.

Broadening the conservation policy of the parent organization, which in the past has been principally associated with the wildlife conservation movement, the new Foundation is undertaking work in the entire conservation field—soil, forests and vegetation, water sources and wildlife. These purposes are expressed in the second Article of the Foundation's certificate of incorporation, which reads:

"The objects and purposes for which the corporation is formed are to promote conservation of the earth's life-supporting resources — animal life, forests and other plant life, water sources and productive soils — and to advance, improve and encourage knowledge and understanding of such resources, their natural distribution and wise use and their essential relationship to each other and to the sustenance and enrichment of all life."

While Government continues efforts in behalf of conservation on both the Federal and State levels, and although there are a number of important private organizations working for the solution of one or another of conservation's many problems, the need for such an agency as the Conservation Foundation is, we believe, fully

substantiated by the results of the staff's work during the brief period of its existence.

Preliminary Action

During the war years the New York Zoological Society, both its trustees and staff members, determined to reorganize the Society's conservation policies as soon as the war was over, broadening their scope and implementing them with a separate and independent staff. To this end the Conservation Division of the Society was established with one staff member in the autumn of 1946.

Interest in the new undertaking, which at that time had no program other than the principle of its establishment, soon was evinced by the proposals of a number of well-qualified men anxious to explore the field of opportunity for this enterprise and to help in the determination of its policies and its initial work program. During the winter of 1946 and the following spring, three more men were recruited for this work, temporary offices were set up, furnished and staffed, and the job of assessing the opportunities for work was undertaken.

During the spring and summer of 1947 the four key staff members deployed over a territory extending from Western Europe to the Pacific Coast, making contacts, attending conferences, familiarizing themselves with the personalities and programs operating in the conservation field. This vitally important background work enabled them to reassemble in the fall of last year with a number of concrete suggestions for projects to be

evaluated and integrated into the Division's first work program — a program concerned first with conservation research, and then with education.

Circumstances have modified the details of this original "blue print" in many respects. The priorities of many of the projects have shifted. The emergence of many new and unexpected opportunities has made it necessary to postpone work on some of them. Others cannot be undertaken until more funds are secured. Without a detailed explanation of what the original list comprised, it is sufficient only to say that they are all still judged to be conservation objectives of the highest importance.

In the course of this exploratory period many individuals in many organizations were consulted. An Advisory Council of scientists and conservationists was formed. The proposed projects were discussed with those best qualified to evaluate them. During these preliminary investigations the staff of what is now the Conservation Foundation received the following recognition for the organization as a whole and for individual staff members:

- (1) Endorsement of its principles and cooperation with its efforts were obtained from the U. S. Forest Service; the U. S. Soil Conservation Service; the U. S. Fish and Wildlife Service and the National Park Service.
- (2) The president of the Foundation was appointed to serve on the Conservation Advisory Committee of the U. S. Department of the Interior.
- (3) He was also appointed to the Advisory Committee to the Economic and Social Council of the United Nations (ECOSOC) in connection with its meeting in May, 1949.
- (4) The Foundation has been invited by ECOSOC to assist in the preparation of its agenda for the International Conference on Natural Resources to be held at the United Nations in May, 1949.
- (5) The Foundation and the Food and Agriculture Organization of the United Nations are jointly planning to undertake a survey of the "incidence, extent and character of man-accelerated soil erosion" with the object of producing a comprehensive report of danger areas supplemented by authoritative maps.

- (6) An effective liaison was established with both the New York State and New York City Boards of Education for the purpose of developing a comprehensive program for conservation education in the primary and secondary schools.

- (7) A highly competent crew was developed for the production of educational motion pictures on conservation.

It will be noted that these appointments and associations, made in the few months prior to the Foundation's incorporation, constitute opportunities for effort for the most part rather than accomplished results. However, the potential importance of the Foundation seems clear from the fact that these opportunities arose for the most part spontaneously on all desirable levels — international, national, state and local.

"Our Plundered Planet"

Preceding the Foundation's incorporation by only a few days, an event occurred on March 25, 1948, which perhaps has given more form and direction to the new Foundation's immediate future than any other circumstances in its brief history. This was the publication of "Our Plundered Planet" by the Foundation's president, Fairfield Osborn. This work, planned as an expression of the philosophy upon which the Foundation is based, has had an acceptance beyond the most optimistic hope for it. Widely and most favorably reviewed by newspapers and magazines of all types and shades of opinion, the book may well be said to have placed the Foundation squarely in the van of the conservation movement in a matter of days following its appearance in the bookshops.

Heralded as "perhaps the most convincing account of man's material plight that has yet appeared" (Paul B. Sears, *New York Herald-Tribune*), Mr. Osborn's book almost immediately became required reading in a number of Universities and Colleges including Harvard and Yale. Its theme has served as the basis for newspaper editorials, commencement speeches and Phi Beta Kappa addresses. It is already in the hands of every member of Congress. It will in the next few weeks come to the attention of all presidential candidates. It may fairly be said to have done more to set the future course of the Conservation

Foundation than any other single event could have done. This was a result to be hoped for, but scarcely to have been expected in such encouraging terms.

"Our Plundered Planet" has, needless to say, opened a flood of opportunities both for its author and for the Foundation's staff. It has been necessary to set up procedures for screening these possibilities carefully since they could not all be followed.

To illustrate their scope and their importance, a selection of the most significant ones is briefly described in the following paragraphs:

- (1) On May 7-8, 1948, Mr. Osborn made the keynote speech at the National Conference on Land-Use Policy held in Omaha, Nebraska, which was attended by several hundred industrial, business, governmental and scientific leaders. This was the first time such a gathering has ever been convened, and, while its immediate accomplishment was by no means complete, it assuredly has great significance for the future.
- (2) As a result of this conference, a dinner was given in New York on June 15 sponsored by four of those present and attended by the presidents or executive officers of some thirty such corporations as the Sears-Roebuck Company, Curtis Publishing Company, the Illinois Central Railroad, Bankers Trust Company, Chemical Bank & Trust Company, Wilson and Company, Consolidated Edison, Prudential Insurance Company of America, Weyerhaeuser Timber Company, Corn Products Refining Company, General Foods Corporation and U. S. Steel Corporation. General Dwight D. Eisenhower was present in his new role as president of Columbia University. Mr. Osborn again addressed the dinner guests, and those present unanimously pledged their effort in support of a permanent committee on conservation to grow out of this initial group.
- (3) Mr. Osborn has been designated as an advisory expert on the preparatory committee of UNESCO for the United Nations Scientific Conference on the Conservation and Utilization of Resources which meets in May, 1949.

- (4) At the Inter American Conference on Conservation of Renewable Natural Resources to be held September 7 to 20 in Denver, Colorado, Mr. Osborn will make the principal address before the panel on the Dynamics of Renewable Resources. At this same conference, George E. Brewer, Jr., vice-president of the Foundation, will address the panel on Education in Conservation Dynamics.
- (5) On September 14 in Washington Mr. Osborn will again take part in a four-man panel discussion of "The Fate of Man" to be held under the auspices of the American Association for the Advancement of Science to be broadcast over the Town Meeting of the Air. The other three members of the panel will be Karl T. Compton, Harlow Shapley and Robert S. Hutchins.

These examples of the interest evoked by "Our Plundered Planet" are sufficient to illustrate the force which it has had in bringing its subject, its author and the Conservation Foundation sharply to the attention of the general public.

Meanwhile work in progress by the Foundation's staff has gone forward — projects, it will be noted, in the fields of conservation education and research.

In Education

- (1) Under the direction of Mr. Brewer, four eleven-minute educational films with sound and color have been completed. These films, to be known as the Living Earth Series, will be distributed this fall by Encyclopaedia Britannica Films, Inc., and preliminary reports indicate that they will have an unusually high acceptance.
- (2) A second series of educational films, to be known as "The Living Forest" series, is in progress.
- (3) An "impact" film planned for commercial release and comprehending briefly though fully the subject matter of the Living Earth Series is in advanced script form and much of its photography has been completed.
- (4) Plans for a series of film strips to tell the story of "Our Plundered Planet" pictorially for school use is under study.

- (5) Adaptation of "Our Plundered Planet" for school text-books is in progress.
- (6) Meetings with the heads of the New York State Board of Education have culminated in the decision to incorporate conservation education throughout the state school system. This work to date has been ably carried forward by staff member A. William Smith.
- (7) Through a liaison with the United States Office of Education the Foundation has been able to secure the appointment of a Committee on Conservation Education with representatives from each division of the U.S.O.E. This activity has been under the direction of Samuel Ordway, Jr.
- (8) As the result of a talk by Mr. Osborn before the members of Berkeley College, Yale University, on February 25, a series of discussions was entered into with members of the Yale faculty with the purpose of determining the ways and means by which conservation teaching can be integrated with the curriculum. In consequence of these conferences Yale is now considering the inclusion of two courses on the subject, one at the graduate level, in the fall term of 1949.
- (9) Giving force to the Foundation's program of popular education, plans for the 11-acre Conservation Exhibit area at the New York Zoological Park are advancing to the day when this enterprise can be launched. This is a joint undertaking of the Foundation, the New York Zoological Society, the New York State Department of Conservation and the City of New York. The State will supply the funds, the City the land and the Foundation and the Society the administration. It is hoped that this exhibit will stimulate the creation of such demonstration areas in other population centers.
- (10) A "traveling" conservation show to be distributed by the Garden Clubs of America is under consideration.

In Research

Earlier in this report we have mentioned the Soil Erosion Survey that has long stood on the Foundation's agenda. Dr. Mark Baldwin, formerly head of the Soil Utilization Section of the Food and Agriculture Organization of the United Nations, has accepted the Directorship of this survey, and is in Europe at the moment of writing conferring with world soil scientists. His trip was made possible by the Foundation.

The Foundation has also helped to implement the completion of a preliminary survey of conservation education directed by Dr. E. Laurence Palmer, Professor of Nature and Science Education, Department of Agriculture, Cornell University. Support for this work also came from the Charles Lathrop Pack Trust and several other foundations.

In April, 1949, the Conservation Foundation will be represented by Harold Coolidge, a member of its Advisory Council, at the meetings of UNESCO in Fontainebleau, France, held for the purpose of carrying on the work of the Brunnen Conference in an attempt to set up a Union for the protection of nature.

The plan prepared by members of the Foundation's staff, notably by Robert G. Snider, has been accepted as the agenda for the plenary sessions of UNESCO at its 1949 meetings already described.

Within less than a year's time since the drafting of its initial work program, the Conservation Foundation has found itself in a somewhat unique position of leadership in the fight to conserve our natural resources, and in the situation of having more work offered to it than can be immediately undertaken. It is to be hoped that funds will be forthcoming to enable the staff to proceed at the present speed rate towards the objective that depends so much on time.

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

Dacca and Her Three Cubs Are on Exhibition

Opinion of the Zoological Park staff as to what is the best exhibit in the Zoo varies from time to time. Recently it has been a race between little Andy, the baby Orang-utan, and the Common Marmosets which are in the throes of bringing up a lively family of two babies. But when Dacca, our tiger mother, brought her three cubs out of doors in the north bay of the Lion House on July 8, there has been no further question: Dacca and her cubs are the best show in the Zoo.

For two or three weeks the youngsters had been making tentative excursions into the world, from the darkness and security of the sleeping compartment in the wall of the Lion House where they were born, but they were never fully on exhibition until they were given the freedom of the big outdoors compartment. Dacca herself found it strange and disturbing to have so much room, and the cubs padded after her wherever she went on her round of inspection. In fact, they were so restless and so determined to stick close to their mother that General Curator Crandall ordered them taken back into their smaller inside cage after a few hours, for fear they would become overheated and overtired.

On subsequent days they settled down and only one hazard presented itself — the high rock ledge that forms the background of the cage. Dacca has a liking for stretching out and resting on the very top of the ledge, and the cubs were determined to join her there. They are still too small and uncertain of their footing, and there was danger that they would tumble from the very top. Consequently they were taken indoors for another day while the Maintenance Department cut and anchored a series of plywood baffles that let Dacca climb to the top but effectively bar the

way for the babies. Dacca now has a place to which she can retire and rest when her babies get on her nerves.*

At the age of 10 weeks, the young Tigers are astonishingly fat. They weigh: Prince, 18 pounds 13 ounces; Princess, 15 pounds 3 ounces; Duke, 14 pounds 12 ounces. At a corresponding age, Rajpur, Raniganj and Dacca, who were hand-reared, averaged four pounds lighter.

Pete Still Going Strong

Peter the Great, our elderly male Hippopotamus, was 45 years old on July 13 and as usual posed docilely for newspaper photographers. He is without doubt the oldest male Hippopotamus in captivity but it appears that he has one year to go before setting a longevity record for his species. The record is held by Betsy II of the Amsterdam Zoological Garden, which is said to have died in 1944 at the age of 46 years.

A Rare Fish from West Africa

The mormyrid fish of Africa, often depicted on ancient Egyptian monuments, were probably better known to the Egyptians than they are to present-day scientists. At any rate, very few have ever been exhibited, and the New York Aquarium has not had any in its tanks since 1939 — until now, when a species new to exhibition in the United States has been put on display. Only live specimens have been obtained so far, so it has been impossible to examine the fish and determine its scientific name.

The new mormyrid is about five inches long,

* On July 24, just as we were going to press, Dacca gave way to her "nerves" and slapped the cubs, which had been tumbling over her all afternoon. The blow — meant as normal maternal chastisement, broke the left hind leg of Princess. She will be off exhibition for several weeks.



Our first baby Addax found a sympathetic and patient foster mother in Mrs. Helen Martini, who had to take over when the little antelope's own mother refused to nurse it. This picture was made when the Addax was three days old and just learning what the nursing bottle was for.

entirely velvety black except for creamy bands on the tail. It does not have the recurved snout so typical of the mormyrids, but it does have a flexible chin-barbel projecting from the lower jaw. What purpose it serves, nobody as yet knows.

In 1939 the New York Aquarium exhibited the first mormyrid ever publicly shown in America. It came from the upper Nile.

We Have a King Cobra Again

After two years without a King Cobra in our Reptile House collection, we now have a beauty — a new specimen something more than twelve feet long and apparently in excellent health. It came from India on July 2 via the Zurich Zoological Garden.

Our most recent King Cobra died on July 15, 1946, after being in the collection nine years and nine months. Curator Brayton Eddy estimates that during that time it consumed a third of a ton of snakes — mostly gopher snakes from the southwestern United States.

Grant for Cancer Research

Dr. Ross F. Nigrelli, the Aquarium's Pathologist, and Dr. Eli Goldsmith of New York University Dental College, have been awarded a grant of \$8,500 by the National Advisory Cancer Council to continue their work on the cancer-producing action of hormones and a certain complex of chemicals.

"The New Yorker" Visits the Zoo

In its department called "The Talk of the Town," *The New Yorker* on June 19 published the article which follows. It is reprinted here by permission because we like it about as much as anything that has been written about the Zoological Park in a long, long time.

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ON A WARM, MISERABLE MORNING last week we went up to the Bronx Zoo to see the moose calf and to break in a new pair of black shoes. We encountered better luck than we had bargained for. The cow moose and her young one were standing near the wall of the deer park below the monkey house, and in order to get a better view we strolled down to the lower end of the park, by the brook. The path there is not much travelled. As we approached the corner where the brook trickles under the wire fence, we noticed a red deer getting to her feet. Beside her, on legs that were just learning their business, was a spotted fawn, as small and perfect as a trinket seen through a reducing glass. They stood there, mother and child, under a gray beech whose trunk was engraved with dozens of hearts and initials. Stretched on the ground was another fawn, and we realized that the doe had just finished twinning. The second fawn was still wet, still unrisen. Here was a scene of rare sylvan splendor, in one of our five favorite boroughs, and we couldn't have asked for more. Even our new shoes seemed to be working out all right and weren't hurting much.

The doe was only a couple of feet from the wire, and we sat down on a rock at the edge of the footpath to see what sort of start young fawns get in the deep fastnesses of Mittel Bronx. The mother, mildly resentful of our presence and dazed from her labor, raised one forefoot and stamped primly. Then she lowered her head, picked up the afterbirth, and began dutifully to eat it, allowing it to swing crazily from her mouth, as though it were a bunch of withered beet greens. From the monkey house came the loud, insane hooting of some captious primate, filling the whole woodland with a wild hooroar. As we watched, the sun broke weakly through,

brightened the rich red of the fawns, and kindled their white spots. Occasionally a sightseer would appear and wander aimlessly by, but of all who passed none was aware that anything extraordinary had occurred. "Looka the kangaroos!" a child cried. And he and his mother stared sullenly at the deer and then walked on.

In a few moments the second twin gathered all his legs and all his ingenuity and arose, to stand for the first time sniffing the mysteries of a park for captive deer. The doe, in recognition of his achievement, quit her other work and began to dry him, running her tongue against the grain and paying particular attention to the key points. Meanwhile the first fawn tiptoed toward the shallow brook, in little stops and goes, and started across. He paused midstream to make a slight contribution, as a child does in bathing. Then, while his mother watched, he continued across, gained the other side, selected a hiding place, and lay down under a skunk-cabbage leaf next to the fence, in perfect concealment, his legs folded neatly under him. Without actually going out of sight, he had managed to disappear completely in the shifting light and shade. From somewhere a long way off a twelve-o'clock whistle sounded. We hung around awhile, but he never budged. Before we left, we crossed the brook ourself, just outside the fence, knelt, reached through the wire, and tested the truth of what we had once heard: that you can scratch a new fawn between the ears without starting him. You can indeed.

Society Will Have Exhibit In City Celebration

New York City will celebrate, between August 23 and September 19, the fiftieth anniversary of the consolidation of the five boroughs. The Zoological Society and other cultural institutions in the city will be represented by exhibits in the Grand Central Palace, prepared under the direction of the American Museum of Natural History. We are sending tropical fish, brightly colored birds and a family of marmosets.

Snake-catching in the Bronx; or, It's All in the Day's Work

The truck, red and enormous, had just rolled to a stop behind the Reptile House when Headkeeper of Birds George Scott rounded the corner on his way home. The driver and another man were standing beside the truck, looking around uncertainly. They walked to meet Scott.

"There's a snake in the truck."

"What kind of a snake?"

"A snake. How should I know what kind? It's a snake."

It was around six o'clock in the evening and the Reptile House staff had gone home. Mr. Scott lives in an apartment in the old service building directly across the road, and he thought of going upstairs and calling Fred Taggart, the Headkeeper of Reptiles. But then he figured it was probably a garter snake or some other small harmless species that had crept into the truck's cargo, and it would be a shame to disturb Taggart for nothing.

"Open her up," he said. The truck driver

unlocked the rear doors of the truck and leaped backward.

"He must have jumped twenty feet, getting away from that truck," Scott says.

"The truck was about a quarter full of shoe cartons and I couldn't see any snake, so I climbed in and began pushing the boxes around. In the right-hand corner at the front there was the snake. It wasn't any garter snake — it was a Regal Python, coiled up and quiet.

"I started asking questions then, and the driver told me the day before he'd picked up a snake box at an animal dealer's here in the city. It was consigned to Washington Zoo, and he dropped it at an express office. Then he went on to Boston with a load, brought back a truckful of shoes, and was unloading here in the Bronx when he saw the snake. It'd escaped from the box for Washington and had been hiding behind a partition in the truck — all the way to Boston and back. He was good and scared and wanted to call the cops and have them shoot the snake, but the manager of the shoe store where he was

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New York Daily News Photo

Baby tigers in the Zoo become accustomed almost from birth to the quick dazzle of photographers' flashbulbs. Under Mrs. Martini's watchful eye, our three cubs made their debut July 8.

delivering his load had the better idea of driving over to the Zoo.

"Well, it was a kind of little python, about ten feet long I figured, so I picked it up. It was quiet and didn't make a fuss, but it started wrapping itself around me. Afraid I'd let it fall, I guess. In about one minute it had two coils around my neck, like a collar. It wasn't squeezing hard, just hanging on. The worst part was that I had one hand full with the snake's head and neck, and had its tail in the other hand, and some loops were hindering my arms.

"Before I knew what kind of a snake it was, I'd piled up a barrier of cartons at the end of the truck to keep it from crawling out, if it was a little snake. With the python draped around me the cartons were in the way and I couldn't climb out. The driver and the shoe store manager wouldn't come and pull the boxes away — they were standing about fifty feet off, goggle-eyed. Finally I kicked the cartons out and climbed down on them.

"My wife was looking out of the window and when she saw me come out with a snake around my neck she phoned Fred Taggart and he came

right over. Before he got there, though, I wrangled the python a little and got him partly unwound so I could breathe better. Fred took him the rest of the way off me and put him in a cage until the animal dealer could come and get him next day. It was a good thing the python didn't start squeezing me, though.

"Me scared? It's all in the day's work."

PUBLICATIONS OF INTEREST

ANIMALS OF THE U.S.S.R. By G. M. Vevers, with 97 illus. by Erna Pinner. Pp. xiv 95. William Heinemann, Lt., London & Toronto, 1948. 21 shillings.

Dr. Vevers' book is intended to give a general overall view of the great faunal wealth of the more than eight million square miles included in the Soviet Union. Only the most striking or characteristic species are included, with brief but authentic life-histories of each. In the selection, mammals have much the best of it, leaving space for only a few birds, four reptiles and a single fish. The style is non-technical and so informative that the reader is left with the wish that the work could have been more extensive. The most successful drawings depict subjects which lack feathers or flowing pelage. — L.S.C.

ISLAND LIFE: A Study of the Land Vertebrates of the Islands of Eastern Lake Michigan. By Robert T. Hatt (Editor) and Josselyn Van Tyne, Laurence C. Stuart, Clifford H. Pope and Arnold B. Grobman. Bulletin No. 27 of the Cranbrook Institute of Science. Pp. xi 179, with 43 illustrations and map. 1948. \$4.00.

As the Introduction to this well-planned book remarks, "insular faunas have long been of great interest to naturalists" and have contributed greatly to the foundation of the doctrine of organic evolution. Lake Michigan happens to have a string of small islands admirably situated for intensive studies by the Cranbrook Institute of Science at Bloomfield Hills, Mich., and the

University of Michigan. Collecting parties from these two institutions worked on these islands from 1937 to 1940 and again in 1944. This is a report on the mammals, birds, amphibians and reptiles collected, with sections on the modification of habits observed, the factors that may have influenced the sometimes curious distribution of animal life, and such material on the geological and cultural history of the islands and their physical characteristics as is necessary to an understanding of the animal population.



At the beginning of their 1948 exhibition season, the three Duck-billed Platypuses were weighed. Here Cecil, the male, is ready to be put on the scales (he weighed 3.54 pounds) by Keeper Blair, while General Curator Crandall and Bird Headkeeper Scott watch proceedings.

It's a Member's Privilege To Keep Cool in the Zoo!

AUGUST is notoriously one of our hottest months. It is hot in the Zoo, too. But Members of the New York Zoological Society have special privileges, and one of them is the right to *keep cool in the Zoo* by dropping into the Administration Building and relaxing in the dim, restful Members' Room.

We don't say it's *cold* in there. It's not an air-conditioned room that might give you a chill. It's just a large, pleasant, easy-chaired room, with plenty of the latest natural history reading matter, and it is *always delightfully cool* no matter what the heat of the day outside.

It's one of your inalienable privileges as a Member to enjoy that room. If you're planning your annual mid-summer visit to the Zoo, call our Education Department (FOrdham 7-2000) and make arrangements for a special "Behind-the-Scenes" tour of the Animal Nursery, the Aquarium and the Animal Hospital. Then, after the tour, come in and use the Members' Room. There's ice-water just around the corner — and rest rooms downstairs.



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ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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Jackson Hole Dream

EVERY NOW AND THEN a dream will come true. One did on a recent summer afternoon—July 19th, to be exact — in a valley beneath the feet of the glorious Teton mountains. This day marked the formal opening to the public of the Jackson Hole Wildlife Park, in the creation of which our Society has had the opportunity of taking an active part. The scene was one of rare beauty. In the foreground lay a large level meadow or plain upon which grazed a herd of buffalo and a small band of elk, and just beyond flowed the Snake River, one of the most beautiful of water courses. In the background towered the majestic snow-touched mountains.

Why this new enterprise, referred to elsewhere in these pages, and what is the fabric of this dream that has now become a reality? Essentially the Wildlife Park's motto might well be, "Let there be a greater understanding of primitive places and of the miracle of living things of all and every kind that make such places their home." Or, coming nearer to the tangible and the immediate, let us say that here is a place where the layman and the scientist, each in his own way, may observe and study the animals of this incomparable region and the environment that makes their existence possible. People from every part of our own country and from many foreign countries will come to look and wonder. Even now, scientists and student groups from 14 universities and scientific institutions have taken part in the field research programs that have already been organized. May the place make rich and significant contributions to our comprehension of the living world around us. Though seemingly its master, we cannot truly exist if we are deaf to its messages.

Fairfield Osborn

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The Inauguration of Jackson Hole Wildlife Park

THE JACKSON HOLE WILDLIFE PARK at Moran, Wyoming, was dedicated and officially opened to the public on July 19, after three years of planning. As the prime mover in its creation, the Zoological Society is entitled already to feel a glow of satisfaction, for the Wildlife Park has started off with every evidence that it is going to be a great success.

It is America's newest Park — and unlike any other Park in the United States because it makes a direct attempt to interest its visitors in wildlife conservation by showing them, under natural conditions, the animals that Americans are being asked to preserve, and because it also operates as a biological field station for the Rocky Mountain area. Students from 14 colleges and universities worked on research problems in the Wildlife Park this summer.

The Park comprises 1,500 acres of extremely

varied land — stands of lodgepole pine, sedge-bordered ponds and marshes, sagebrush slopes, groves of quaking aspen and flat grasslands through which wind the Snake River and its backwater. The land was made available by John D. Rockefeller, Jr., and Laurance S. Rockefeller through Jackson Hole Preserve, Inc. In the sponsorship of the Park, the Zoological Society is associated with the Preserve and with the Wyoming Game and Fish Commission.

Four hundred of the 1,500 acres are under fence to make the initial herds of Buffalo and Elk easily observable by tourists, and there are other herds of Moose, Mule and White-tailed Deer and Pronghorn Antelope in the Park.

Wapiti in the Wildlife Park as visitors see them —apparently at complete liberty but actually kept within view by almost invisible barriers.





Laurance S. Rockefeller made one of the dedicatory addresses. Other speakers were (left to right): Lester Bagley, Wyoming Game and Fish Commissioner; Fairfield Osborn, president of the New York Zoological Society; Carl Jorgensen, president of the Wyoming Game and Fish Commission; Charles Moore, president of the Wyoming Dude Ranchers' Association; the Hon. Lester C. Hunt, Governor of Wyoming; and James R. Simon, Director of the Jackson Hole Wildlife Park.



Research facilities in the Wildlife Park center in this simple but adequate building of lodgepole pine. The laboratory was used by students working at the Park all this past summer.

This is the setting of the Wildlife Park. It occupies the foreground and center of this scene, with Jackson Lake and the Grand Tetons beyond. The river is the appropriately-named Snake.





LEFT. When these Prairie Falcons grow up, they will become mighty hunters of wild rodents.



RIGHT. Bison at ease in the meadow, with Mt. Moran looming snow-covered beyond them.





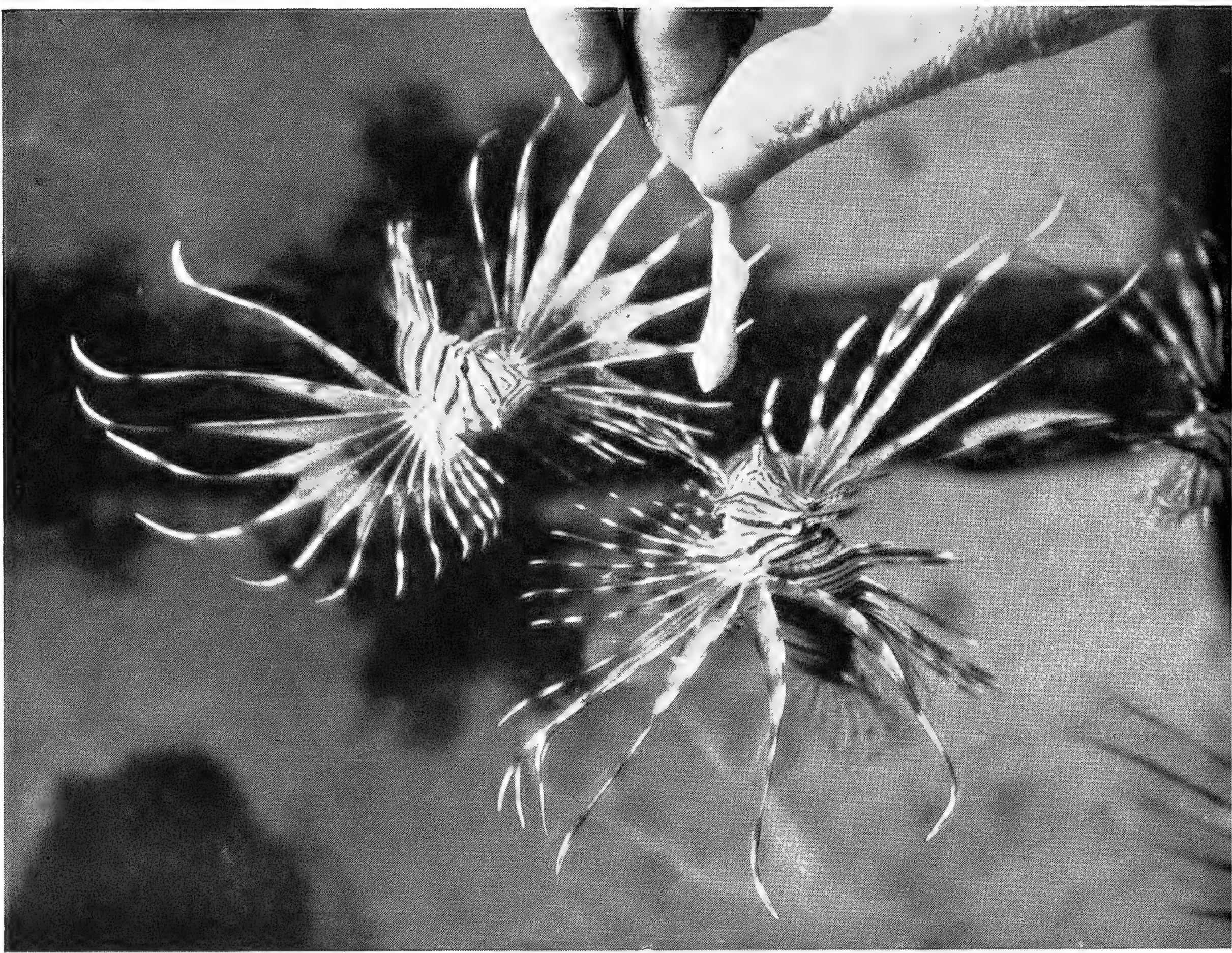
LEFT. *A sprightly Chipping Sparrow has just been attending to the food requirements of her brood, only recently out of the nest.*



RIGHT. *"The Bum," a tame Mule Deer that always comes up to be photographed by Park visitors.*

Moose are to be seen in the Wildlife Park at almost any time of the day. This is a youngster that came down to one of the many ponds and areas of still, shallow water in the Park, where Moose love to feed and rest.





Feeding the Fishes

By JAMES W. ATZ

THE new South American Lungfish turned out to be a problem. Although it had apparently settled down in the exhibition tank alongside its African relative, it had so far refused to eat. Almost three weeks had passed since it had made the long air trip from Brazil to New York, and the Aquarium's crew was beginning to worry. Fasting for a month or more does not harm some fishes, but there was no telling how long our lungfish might have been starved before we re-

ceived it. Moreover, it *looked* hungry — to Curator-Aquarist Coates and Tankmen Bloom and Howley, who are versed in such esoteric matters as knowing how a fish feels by the way it looks and acts.

In this instance, however, the fish's actions seemed to belie its appearance, because foods that had been readily taken by numbers of predecessor-lungfishes interested it not at all. Horse heart, cut into strips and dangled alluringly be-

fore its nose or left quietly lying nearby, evoked no response whatsoever. Nor was raw fish, either cut or whole, enticing. Even earthworms, prime favorites with most lungfishes, were only briefly tasted and then rejected and ignored. What next to tempt this too fastidious fish? Perhaps something alive and mobile would appeal to it. A small goldfish was put into its tank, but several days later the goldfish was still swimming about, unmolested. Finally someone suggested that a crayfish be tried and one was borrowed from the crayfish supply tank, kept at the Aquarium for the Duck-billed Platypuses. Next morning the crayfish was gone. Very soon the lungfish ate another and from then on there was no more trouble. It was not even necessary to continue to feed crayfish, for once its appetite was stimulated, our lungfish readily took the more ordinary — and less expensive — foods that it had previously refused.

The task of titillating a lungfish's palate is only one of many that might confront those who maintain a large and varied collection of living fishes.

These Zebra Fish from the Indian Ocean normally eat other fish, alive, but in captivity they can be taught to accept other food, such as bits of clam which an attendant is offering to these specimens.

The feeding of each new specimen is likely to be a problem, to be solved by previous experiences with similar fishes, by knowledge of habits in the wild, or, if all else fails, simply by trial and error. At the New York Aquarium the weaning of fish from their natural diet to a practicable artificial one is so routine that definite procedures have been worked out. For example, by repeatedly dropping bits of raw fish in front of their snouts, hungry Electric Eels can usually be conditioned to take this substitute for the living fishes, frogs and the like on which they subsist in nature. They are accustomed to electrocute their prey and in captivity they never learn that it isn't necessary to shock the dead, artificial food before swallowing it. Patience and perseverance are prerequisite for the job of weaning an Electric Eel. Curator Coates states that in general not until three meals of artificial food have been taken can any new fish be considered fully conditioned or "broken in."

Some fish, however, never learn to take the substitutes offered them in captivity. No Leaf-fish, for instance, will eat anything but living fish, and only one out of scores of Pantodon, the Freshwater Butterfly Fish, will ever take anything but live insects.¹ (We feed ours on cockroaches). Yet it is surprising how many species *will* adapt themselves to the artificial diets of public aquariums. Among these are some of the most savage fishes known and the most dangerous to man. A school of blood-crazed Piranhas can skeletonize a 400-pound hog in ten minutes, but in captivity they are content with pieces of plain raw meat. Barracudas are often called the tigers of the sea and in nature apparently feed exclusively on other fishes — with an occasional attempt to tear apart unwary human swimmers. Once confined in a tank, though, they become quite docile and can be taught to eat dead fish in place of live ones. The last Barracuda we had was so tame that it refused to chase living prey and would eat chopped fish and clams only from the Tankman's hands.

Nature spreads a bountiful table for fishes, offers an enormous variety of food objects. We who must set the table in captivity cannot be so lavish. What aquarium could provide its hungry exhibits with hundreds of kinds of living fishes, with sea-squirrels, starfishes, sea-urchins, moss-animals, squid, clams, oysters, mussels, snails, insect larvae and adults, crabs, lobsters, shrimp, worms, jellyfish and coral — to say nothing of myriads of almost microscopic animals and aquatic plants of all sorts? Even if all these *could* be collected, the cost of doing so would be absolutely prohibitive. Fortunately, many fish are not "set in their ways" as far as feeding habits are concerned. What the aquarist does is to develop a few practicable, basic rations that will satisfy the majority of his charges and then modify and supplement those rations to accommodate the more intransigent feeders that have enough "exhibition value" to warrant the extra expense and attention.

A basic diet for small, tropical freshwater fishes, which comprise the majority of our present collection in the Lion House, was devised many years ago by Curator Coates and consisted of a mixture of raw whole fish, beef heart, clams, shrimp and lettuce, all chopped up very fine. This mixture is still used today except that horse

heart has been substituted for beef heart and the shrimp omitted and fed separately as a dried powder. In the old days preparing these ingredients meant literally hours at the chopping board, but in 1941 Dr. Myron Gordon discovered that a new type of cocktail mixer was just the machine thoroughly to mince up these substances.² Now Tankman Bloom pours some clam juice into his mixer, adds small pieces of meat, fish, clam and lettuce and in a minute or two has a finely minced mixture which he then thickens with Pablum until it becomes a rich, buff-colored, paste-like substance. It must be extremely tasty to piscine palates, if the avid way our fishes eat it is any indication.

This composite food is fed to the smaller fishes twice a week — doled out carefully so that no excess remains to foul the water in the tanks. Live food, usually "Tubifex" worms, is given between meals, and once a week the small fishes get powdered dried shrimp and salmon eggs. Larger fishes are fed according to their size and appetites, some every day, others as seldom as once a week.

A complicated regimen like this insures that a wide variety of proteins, minerals and vitamins will be available. It is necessary because fishes are susceptible to dietary deficiency diseases just as man and other animals are. Vitamin A and various elements of the vitamin B complex have been proved essential to growing trout; it is assumed that they are also needed by other fishes.³ In trout, lack of iodine will cause a condition very like goiter, and an excess or deficiency of other food stuffs can bring about fatty degeneration of the liver.⁴ But the science of fish nutrition is hardly begun and to the aquarium man the feeding of his charges must still be largely an art, even though he suspects that his diets are far from perfect.⁵ All he can do is make his prepared foods as complete as possible, within practical limits, and in addition provide as much and as varied live food as is feasible. At the new New York Aquarium we hope to have facilities and space for raising small fish, mosquito larvae, blow flies, cockroaches, freshwater fleas (*Daphnia*), brine shrimp, earthworms, dwarf tubificid worms, white worms and infusoria.



Yet even all these will not be enough! Our quaint seahorses will want *Gammarus* (tiny relative of crab and lobster), and our colorful parrot fishes will need green sea lettuce, *Ulva*. These foods cannot be cultured — they must be collected at the seashore. Indeed, the Collector for a public aquarium probably spends more of his time getting natural foods for the exhibits, than he does in collecting the exhibits. Armored catfishes and some other freshwater species must have at least a modicum of algae to remain healthy. Snails are important for fish like the freshwater puffers.

Special techniques in feeding will be necessary too. Seahorses and Celestial Telescope Goldfish should be fed by hand to insure that each specimen gets its share. A tankful of vicious Green Moray Eels requires extra care in feeding to prevent quarreling over the food and the often fatal fights that follow. Fishes that “browse” in nature, eating more or less continuously, want to be fed often, perhaps several times each day. Puffers, for example, will not live long if fed only three times a week, but thrive if fed at least once a day.⁶ Caution must be exercised in feeding the gluttonous Frogfish and Sargassum Fish, since these forms never know when they have had enough and will actually eat themselves sick.⁷ The Zebra Fish (*Pterois volitans*) will even eat so much that it dies of indigestion.⁸

A recent development in the study of nutrition in fishes is the clear-cut demonstration that their coloration often depends directly on the kind of food they eat. Like the Zoological Park's flamingos, some fishes require special foods or they lose the bright colors they exhibit in nature. The brilliant red and yellow of wild trout disappears in captive specimens that are fed the usual hatchery or aquarium diets. Except for the loss of color, however, the fish are apparently perfectly healthy and when they are given such natural foods as waterfleas and aquatic insect larvae, they retain their beautiful colors. It would be practically impossible to obtain enough of these minute creatures to feed even a few good-sized trout, but

fresh salmon eggs have been found to provide the necessary material to build up a trout's bright coloration.⁹ Perhaps a satisfactory and practicable diet, consisting of quick-frozen salmon eggs (obtainable at hatcheries) and waterfleas (cultured at the Aquarium) could be worked out. Among marine fishes similar phenomena occur. The dapper Beau-gregory loses its bright yellow when fed only on animal matter; the fish must have a certain amount of marine vegetation to maintain it.⁷ Here is a challenge to the aquarist: can he take advantage of these newly learned facts to improve and beautify his exhibits?

Challenging, too, are those fishes with peculiar feeding habits never yet exhibited in public aquariums. How do the long-nosed Elephant Fishes employ their decurved, tubular snouts? How does the silvery Biara (*Hydrolycus scomberoides*) feed — with canine teeth so long that its mouth must open to at least a right angle before any food can get into it? How do the blood-drinking catfish of South America do their phlebotomizing? Perhaps some day we shall learn the answers to these questions by observing these rarities feeding in the tanks of the new Aquarium.

And perhaps we shall some day exhibit those dietetic anomalies, the fruit-eating fishes. In Brazil the Indians go fishing for the Pacu with bow and arrow. They wait under a fruit tree on a river bank and shoot the fish as it comes to the surface to strike at falling fruit. Where agriculture has destroyed the shore-lining fruit trees, the Pacu has disappeared.¹⁰ In Thailand the Pla Tepo, a large catfish, is much esteemed as food, and the Siamese raise it in ponds. They feed it on many kinds of fruit and vegetables, but its favorite food is bananas.¹¹

All fish-feeding jobs are time-consuming, but if the day ever comes when we exhibit a Pla Tepo, we shall have to remember to allot the Tankman a little extra time for peeling bananas for our banana-eating catfish!

◀ **A perfect instrument for mixing food for fishes is the Waring Blendor, an electric cocktail mixer. Tankman Bloom is combining clam juice, lettuce, meat, fish and chopped clams.**

¹ Coates, *Bull. N. Y. Zool. Soc.*, 37 (5) : 147-150, 1934.

² Gordon, *The Aquarium*, 12 (5) : 86-88, 1943.

³ Simmons, *Aquarium Jour.*, 18 (6) : 22-26, 1947; 19 (1) : 8-10, 1948; McLaren et al., *Arch. Biochem.*, 15 (2) : 169-185, 1947.

⁴ Davis, *U. S. Fish and Wildlife Serv. Res. Rpt.*, 12 : 1-98, 1947.

⁵ Nigrelli, *Zoologica*, 28 (22) : 203-216, 1943.

⁶ Mellen, *Trans. Amer. Fish. Soc.*, 57 : 120-142, 1927.

⁷ Breder, Personal communication, 1948.

⁸ Al-hussaini, *Pub. Marine Biol. Sta. Ghardaqa (Red Sea)*, 5 : 1-61, 1947.

⁹ Steven, *Nature*, 160 (4068) : 540-541, 1947.

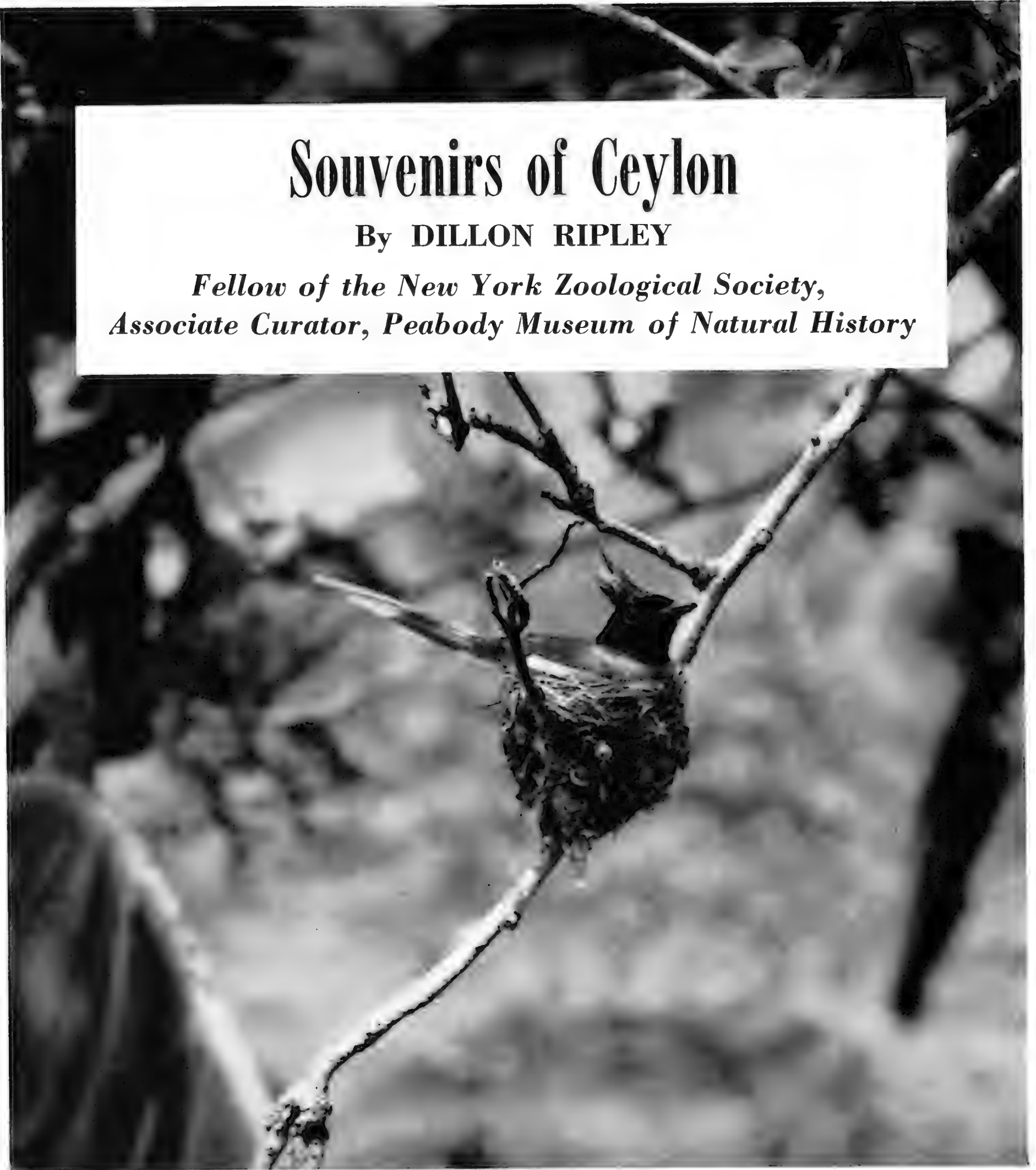
¹⁰ Myers, *Aquarium Jour.*, 18 (4) : 13-20, 1947.

¹¹ Smith, *Bull. U. S. Nat'l Mus.*, 188 : xi+622, 1945.

Souvenirs of Ceylon

By DILLON RIPLEY

*Fellow of the New York Zoological Society,
Associate Curator, Peabody Museum of Natural History*



Certainly the most beautiful bird of Ceylon is the aptly-named Paradise Flycatcher. Here she has built her dainty nest of cobwebs and grass in the fork of a slender, swaying branch.

ONE OF THE PLEASANTEST THINGS that happened to me during the late unlamented War was to be stationed for nearly two years in southeast Asia with headquarters in Ceylon. Besides being one of the really beautiful islands of the world, Ceylon boasts a multitude and variety of birds, most of which I had never had the luck to see before. Even during my first few days in

Colombo, a pleasant but definitely citified town, I began to see strange birds.

My favorite time in Colombo was the late afternoon. Then the heat of the day faded with the light. The town has lovely gardens full of flowering plants, crotons, bougainvillea, cannas, orchids, various cassias and flamboyants, and large glossy-leaved trees like the cashew. Through all

of this riot of color wanders a profusion of birds. Nearly every garden has its pair of barbets. There were two principal kinds in Colombo, of which the commonest is the Green Barbet. This is a bright green nine-inch-long fellow with a faded yellow-brown head, large stubby reddish bill and prominent staring eyes. Its call is a loud rolling series of "tock" noises, very penetrating and monotonous. Barbets are distantly related to woodpeckers and like them bore holes in the softer wood of dead trees in which they make their nests. They fly with a lot of rather inefficient flapping of short round wings in a swooping way like woodpeckers and they land on the side of a tree with a distinct thump sometimes. The whole performance, the staring eyes, the strange attitudes, the gawky appearance, makes one feel that the barbet is a sort of survival, a relic of an earlier age which has just managed to cling on for dear life to the twentieth century. And yet barbets really manage quite well in spite of their clumsiness and have invaded tropical cities quite as successfully as the sleek robin at home.

Then there are the sunbirds of which the commonest is the Purple Sunbird. They are about the size of a small warbler, with curved thin bill. The male is all over blackish-purple, with two small tufts of bright yellow feathers on the flanks. They buzz about such flowers as the hibiscus almost like hummingbirds and they have a surprisingly sweet, clear, finchlike song. The female is rather inconspicuous and mousey, a rather olive-greenish color above and subdued yellow on the underparts. The males are very bold in contrast. I saw one join in a frantic chase that was going on in a backyard garden when a small hawk invaded the place and carried off a young thrush. The commotion was terrific, and in the van of the pursuit was a male sunbird which evidently had a mate and a nest near-by.

Babblers are strange birds, common to Africa and the East, but not really found in our New World. The commonest babbler in Ceylon is one called the "Seven Sisters," always apparently a plural name. The reason is clear for this ubiquitous bird invariably goes about in flocks of some number near seven. It is about the size of a robin, pale mouse brown in color, often very worn and almost whitish on the head. The whole

group moves along continuously, now low on the ground, now higher in some low bush, and all the time keeping up a tinkling rather musical chatter among themselves. As they hop about they droop or pick up their wings, flirt their tails back and forth, all in an agitated nervous way. Possibly the sight and sound of their behavior helps to keep the flock together. It may be a sort of semaphore and wig-wag system. Every so often the whole flock will fly into a tree, much higher than usual, and here they will all set up a great deal of calling in loud, strident voices. When loud, their calls lose all musical pitch and become simply discordant.

But the most surprising backyard birds to me were the kingfishers. The usual one to see is the White-breasted Kingfisher, a bird almost as big as our North American kingfisher with a blood red bill, dressed in chocolate brown, blue and white. These birds have an unexpected habit of flying down into a vegetable patch and scrounging about for beetles or grubs exactly as a thrush would at home. The other kingfisher is a little blue gem, a tiny thing with blue-and-black laddered back, fawn breast and white throat. It seems to buzz about more like an insect than a bird and when it suddenly plunges straight down into a pool of water, it seems as if any fish below could easily devour it, rather than the other way about.

A little pale brownish-gray owl, called the Scops Owl, was also ever present. Just after sunset it would fly by, as silently and dextrously as a bat. Sometimes it flew into verandahs at night, apparently in pursuit of insects, and occasionally became enmeshed in mosquito netting. A pair nested in a hollow tree in a garden where I often sat. Their call was very soft, a single note, almost like the squeak of a shoe, a soft and shivery sound.

The most amazing things about Colombo are the sunsets. I suppose it is the humidity, but the whole atmosphere seems to exude a pinkish, sometimes a rosy, or again a yellow haze. It is not just the sky overhead or the clouds piled high in tumbled masses which are colored. The whole air sweated color from every pore. Even people's faces seem tinted by it. In this strange gilded world, the town of Colombo relaxes. Then is the time of walking abroad, the promenade.



W. W. A. Phillips Photo

The Yellow-browed Bulbul is essentially a jungle-dweller. Its nest is composed of twigs and grass and usually is suspended by the rim to a fork in the top of a thin sapling.

For the Europeans it is a ritual, performed in shorts or walking skirts, with a stick and a brace of dogs on leashes. For the Singhalese there is less conscious informality in clothes. And for the birds and the bats there is the same ritual. The giant fruit bats come out at this hour, leaving their daylong roosts and flying in soundless solemn procession in long trailing lines across the sky, seeking some fruit garden where they can settle down for a night's feast. The crows and the egrets, on the other hand, are going home to roost. Often the streams cross. The birds fly like the bats in long uneven strings, but almost always in groups going to some communal roosting place.

Out in the country my principal pleasure was to drive by one of the tanks, as they are called; reservoirs of water; man-made with earthworks on at least one side. Some of these tanks cover hundreds of acres, and if a small boat can be secured, are fascinating to explore. A friend and

myself borrowed a small collapsible boat from an Army unit and went paddling in one of these large shallow lakes. All sorts of birds abound, especially in the occasional groves of dead or half-dead drowned trees that dot these places. Here are the roosting places of egrets, and their nesting places, too. At the right season it is a fantastic sight to see storks, ibises, cormorants, herons and egrets by the hundred perched on every available bough or branch, gathered about their crude bulky nests from which peer gawky youngsters looking like badly-stuffed specimens in an out-of-date museum.

In the countryside many different birds may be seen, but it is often difficult to secure more than a glimpse of them as they dash across the road. The easiest to spot is the Paradise Flycatcher — aptly named, for it is the most beautiful bird in Ceylon. Both male and female have spangly dark blue-black feathers on the head and throat, and the male has quite a perceptible crest. The rest of the bird is pure white in the male, cinnamon brown above and gray beneath in the female. Both birds have long tails, but the male's is a huge affair with the two central tail feathers prolonged to a foot or more, so that the

effect is of two trailing ribbons dangling behind as it darts from tree to tree. Until a few years ago it was thought that these gorgeous white males were the only true breeding males, but recently it has been discovered that the white males are all migrants from India, and that the breeding males of Ceylon retain the henny or juvenile plumage of the young male which looks exactly like the female, cinnamon and gray, except that they develop long streamer tails. This seems to be a curious trait of birds which have settled in the tropics after moving there from more temperate climates where definite seasons occur. In a place where it is summer all year long, the male bird often forgets to put on all his bright feathers.

Before I left Ceylon I had seen practically every one of the two hundred and forty species and subspecies of birds found there. Sometimes it was not easy to see a new bird and sometimes in my eagerness I found myself in a complicated position. My most embarrassing predicament occurred at Kandy, the ancient capital of Ceylon, now a sleepy village which was resurrected during the War and turned into the Theater Command of southeast Asia and the headquarters of Admiral Lord Louis Mountbatten. I was quartered at an officer's mess and had quite forgotten that that particular afternoon was the one of the big cocktail party. After office, I went back to my quarters, a comfortable palm leaf hut on the end of one of the blocks of palm leaf buildings. In front stretched a strip of green lawn to the edge of a small hill which gradually fell off, far down to a road below. On the slope were tea bushes, now growing rankly, and an occasional shade tree, a small *Albizia* perhaps twenty-five feet tall. Just as I was shaving, clad only in a skimpy bath towel, I saw a shape come swooping over the tea and make for one of the *Albizzias*. From its flight I realized it must be a woodpecker — but which? That was the question. Frantic with curiosity, I rushed out of my hut and down the slope, small-bore collecting gun in hand. I had more than a suspicion that it was the small

green woodpecker which I had not yet seen nor secured for my bird collection. It was; and I took aim and fired. At that, the bird fell and so did my towel. Hastily clutching my towel and retrieving the dead bird, I turned about, only to realize that I had been vaguely conscious of a hum of conversation, which had stopped. Silence reigned as the fifty or so officers, civilians and assembled ladies of the cocktail party craned and peered over the edge of the tea bushes at this extraordinary apparition. My face was so covered with shaving soap that I suppose they never did notice whether it was red!

Some day I would like to go back in peace and quiet and revisit the birds of Ceylon. I know no prettier or more fascinating group of inhabitants anywhere.



Kingfishers are “backyard” birds in Ceylon. This is the common species. Sometimes they fly down into a garden to search for beetles and grubs—very much like our familiar robin.

W. W. A. Phillips Photo

IN HUMAN SOCIETY, "pulling strings" is a roundabout way of getting special favors. In a very literal and direct way, pulling strings paid off in grapes, apples, cherries and other delicacies to a selected group of animals in the New York Zoological Park this summer.

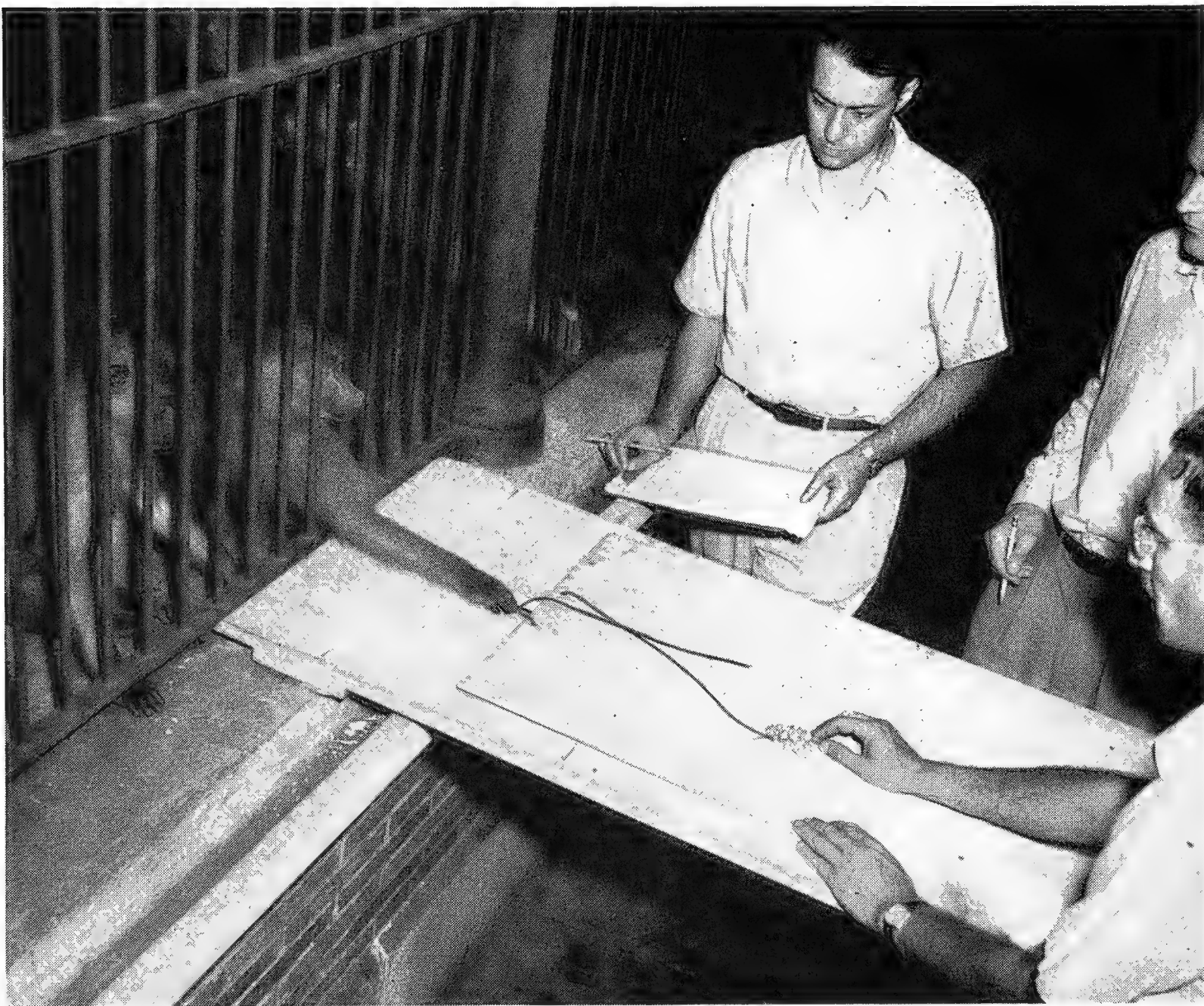
For the second successive summer we have financed a team of animal behaviorists who are exploring the desirability and feasibility of long-term psychological and behavior research among our Zoo animals. Some of their experiments concerned the ability of animals to choose between two solutions of a problem and to make discriminations involving vision, hearing or other senses. Other tests were of motor skills and patterns of individual and social adjustments.

On the margins of this and the next page are the 20 different ways in which strings were arranged in one test. The white circle at the end of one line in each pair represents the reward of food to be gained by pulling that string.

Learning and perception can be demonstrated

by a tabulation of the successes and failures. So, to a certain extent, can "handedness" in regard to several of the test animals. But are "brighter" than others in the quickness of learning? The results of these tests, and the forward-string and the blank one, are fascinating. The full results must await publication in *Zoologica* and *Journal of Experimental Psychology*.

Our Animals In Behavior



A Guinea Baboon pulls the wrong string in an "X" test pictured at the top of the opposite page. Grapes were the reward. Dr. Riess arranges the test while Dr. Ross records the results.



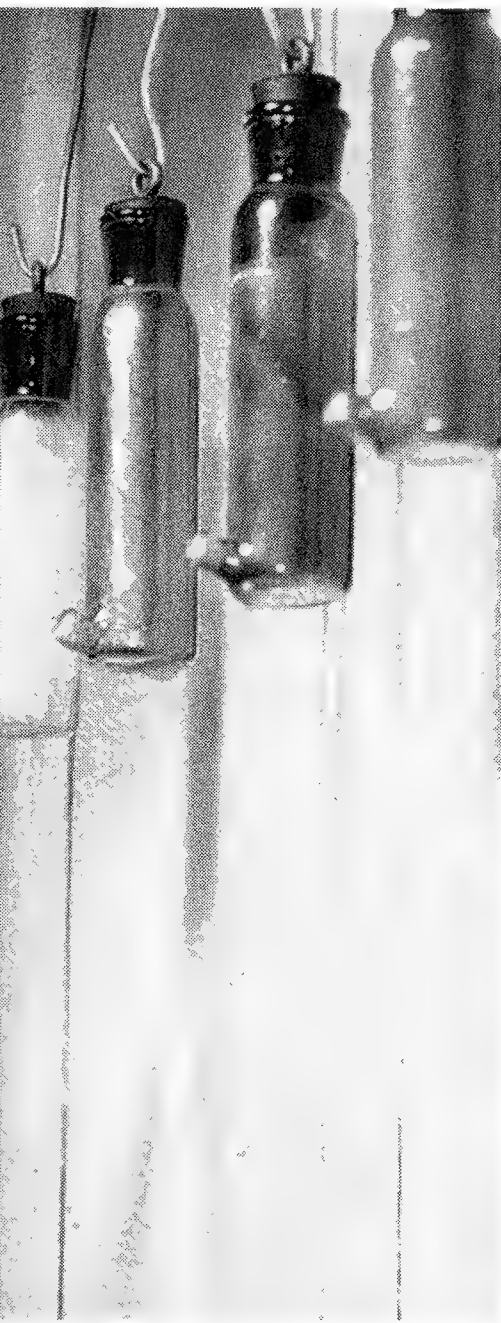
A Mexican Violeteo makes a choice among food items. The results are recorded (Left to Right).

Pull Strings” or Tests

als that pull the strings in hundreds of tests. tual use of right hand or left hand — be stated es are habitual southpaws, and which ones h they learn to distinguish between the re- that cannot be recounted here as yet. They cal journals.

The animal behaviorists have been interested in developmental sequences, as exemplified by the various stages in a baby Sealion’s ability to swim; in vision and the ability to distinguish between colors of various shades and intensity in birds, in social behavior of groups or “societies” of animals, and in family organization among animals. The preliminary results look good; it may be that we have here, in the Zoological Park, a virtually unexploited laboratory for behaviorists and comparative psychologists.

The summer studies were under the general direction of Dr. C. R. Carpenter of the Psychology Department of Pennsylvania State College, and the immediate supervision of Dr. Bernard F. Riess, assistant professor of psychology, Hunter College. Working with Dr. Riess were Dr. Sherman Ross, associate professor of psychology, Bucknell University; Dr. Herbert Birch, assistant professor of psychology at City College; and Samuel B. Lyerly, instructor in psychology at the Pennsylvania State College.



mingbird makes its at are variously col- ue, Green and Red.



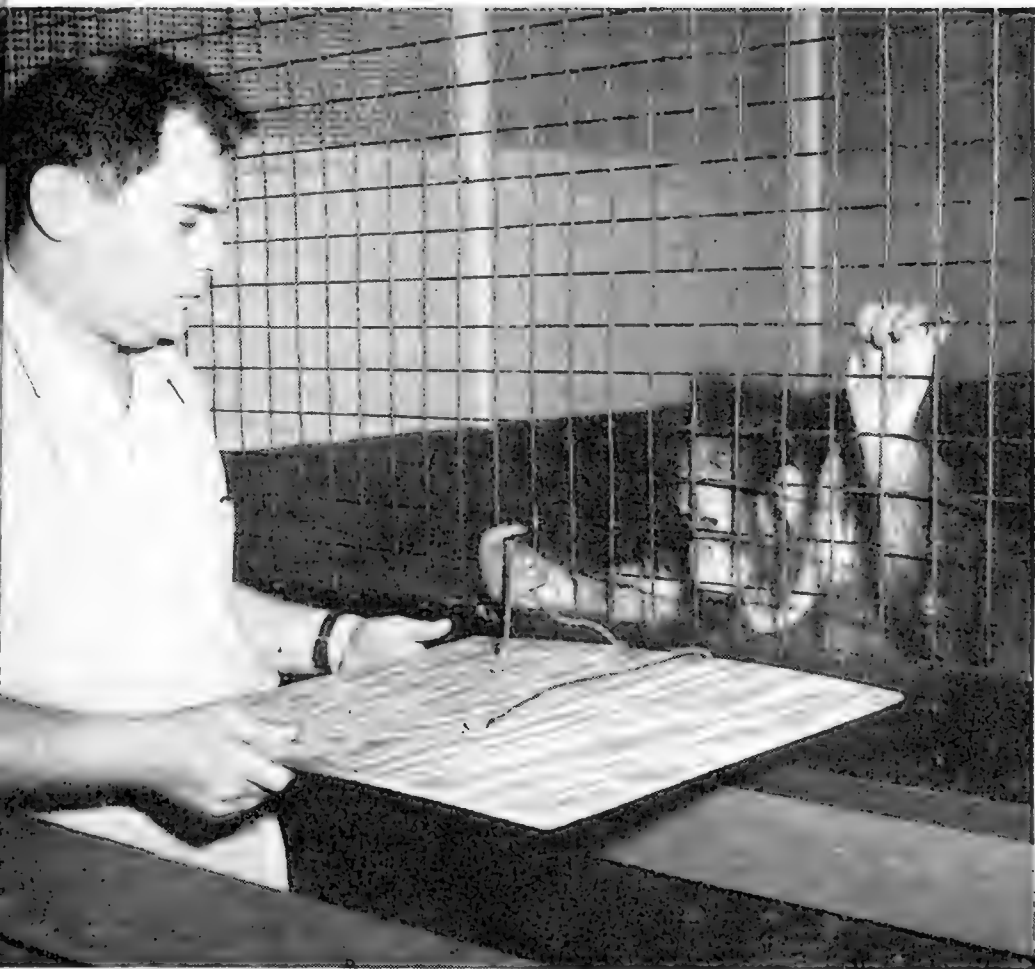
Luck or skill? An Asiatic Elephant chooses the string that leads to an apple, which was always concealed under the dark-colored patch on the box. Mr. Lyerly records a success.



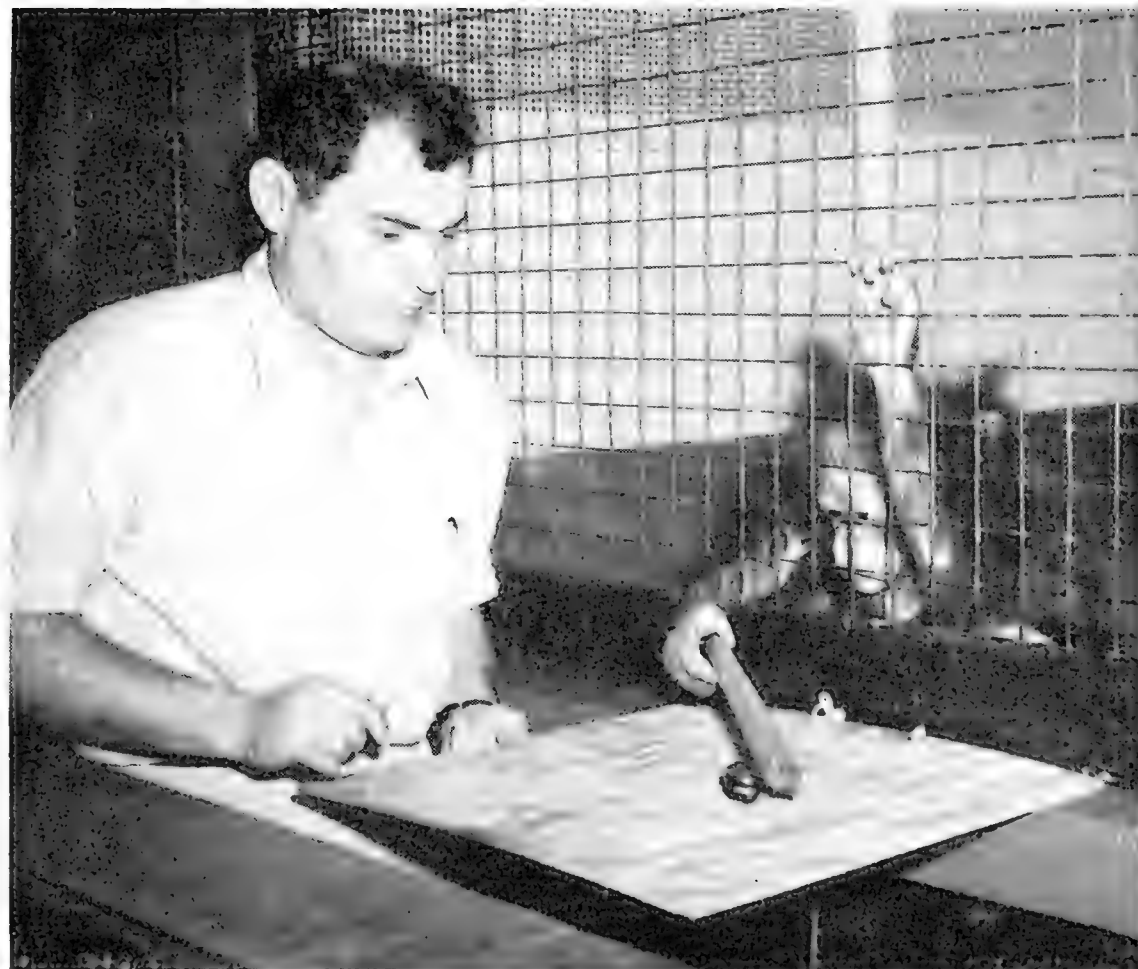
LEFT: Dr. Birch makes friends with Andy, the Orang, preparatory to tests. ABOVE: Andy would rather play than work in tests.



Testing the reactions of the Gibbons to recordings of their own calls, Dr. Ross rows Dr. Riess and a phonograph within a short distance of Gibbon Island. The male comes down to listen.



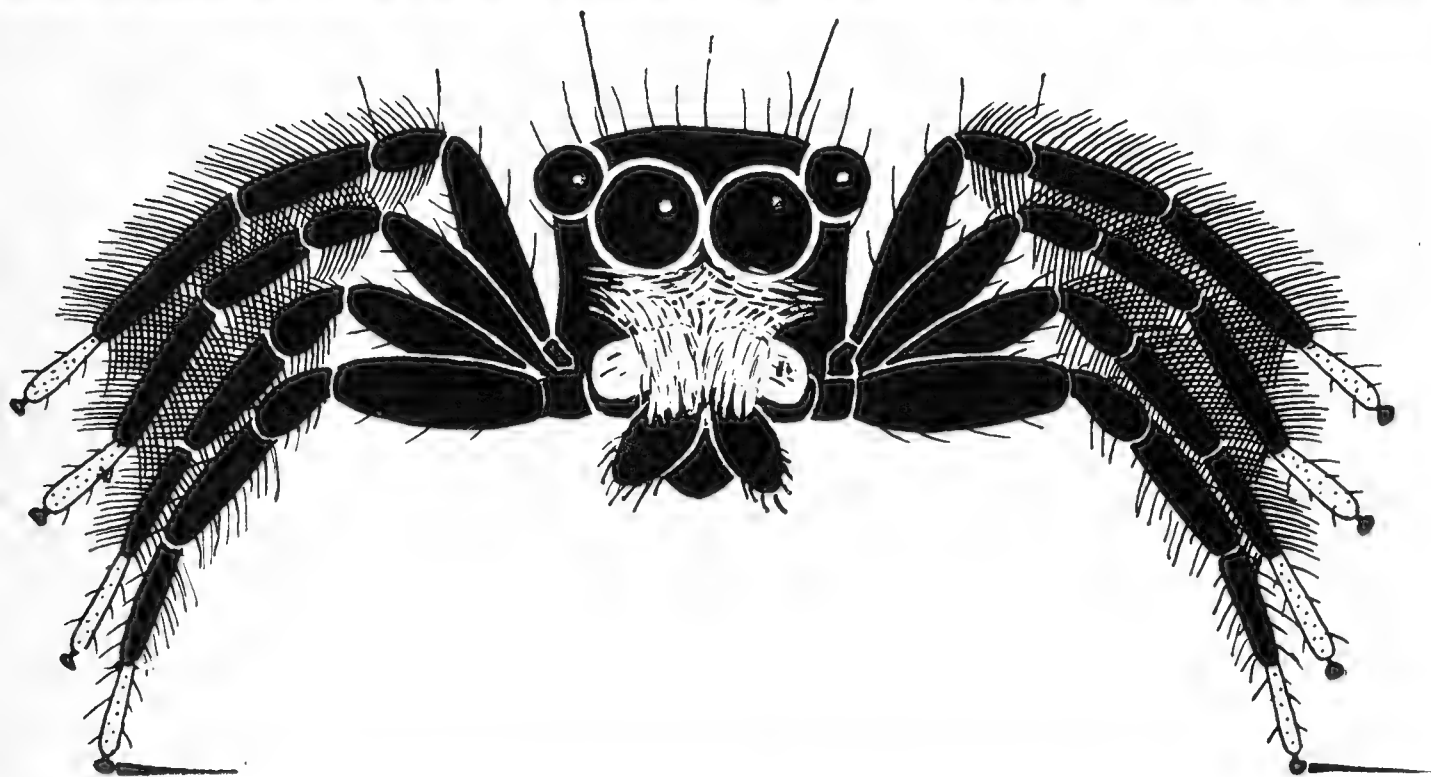
To Dr. Birch's obvious disappointment, Andy has chosen the wrong string and fails this time to collect his reward of a grape.



Progressing from string-pulling to the use of simple tools, Andy is given a stick with which he soon learns how to reach a cherry.

Doruma, one of the young African Elephants, was given a few tests but she was very timid about approaching the strange contraption and was always inclined to back away. Here, anyway, she chose the string with an apple.





The Jumper

YESTERDAY AFTERNOON, right in the middle of our peaceful jungle, one of our top laboratory assistants suffered a nervous breakdown. His eyes are big and black above an incongruous orange mustache, and when the crisis hit him, he switched them wildly back and forth, spun around in circle, and then headed in great leaps for the nearest laboratory window. He has not been seen since. Although a reward has been offered for his recovery, we are not very hopeful, since he stands only a quarter of an inch high, and the Venezuelan jungle is rather tangled here at Rancho Grande.

He is known as X51, which, instead of signifying an FBI agent, means simply that he is the fifty-first specimen of the jumping spider, *Corythalia xanthopa*, to be used in experiments this year. Thanks to him and his fellows, we have had numerous lively sessions trying, in the most scientific way possible, to find out the whys and wherefores of their astonishing appearance and behavior. We want to know why some jumpers are bright red with turquoise blue, others a striking yellow and black, and still others an unin-

spiring brown. We want to know why some have fractious crests of carrot red standing straight above their eyes, and others black fringes of silky hair along their agile legs. And finally, we want to know the evolution through the ages of their courtship dances and, what is even more baffling, the meaning of their ritualistic "battles" with rival males, as complex and stylized as the duels of Javanese dancers.

Comparisons of animal behavior with the quirks and foibles of human beings are always dangerous. You lay yourself open at once to protests from fellow scientists who accuse you, in all justice, of sentimentality and anthropomorphism. Nevertheless, anyone who has once looked a live jumping spider in the eye under the microscope will never again, deep inside himself, feel scientifically detached about a jumper. It is one of the most unnerving experiences in the world, especially if the spider is a green-eyed *Lyssomanes*. Although his "head" is so firmly joined to his midriff that it lacks a separate existence, the whole front half twists so gracefully on his legs, as he peers up at you, that his air of poised atten-

tion is not only comically obvious, but downright dismaying in one so small. A conversational interview seems very much in order, and we should be able to ask him outright the personal questions that are puzzling us. I have always been privately certain, however, that, if only we could find a common language, it would be the jumpers who inevitably would ask the questions.

f Rancho Grande

By JOCELYN CRANE

Meanwhile, we employ various ruses in order to learn about their private lives. For example, the eyes of *Lyssomanes* are not only green, but they change sometimes, both separately and together, to jet black. The spider sits perfectly quiet on the microscope stage, yet, as he looks up at you, a black curtain inside his right eye swings slowly into place, and suddenly he has one very literal black eye while the other stays a limpid emerald. Then the left eye shifts, and, at irregular intervals, both are black or green together. Since each eye is set off with a frame of shiny white hairs from the rest of his green body, the general effect is decidedly startling. In order to find out a possible function for these rolling eyes, we introduced an especially lively *Lyssomanes* to a potential mate on the broad top of a laboratory table.

At first the results were disappointing. Instead of the typical, energetic, jiggling dance I had expected, the suitor just sat. There appeared to be nothing wrong with the female, who was young and presumably attractive. Yet the *Lyssomanes* went on sitting. Occasionally he ex-

erted himself to rise on tip-toe and extend a languid leg or two in her direction, but he soon settled back into stodgy inactivity.

Suddenly, however, it dawned on me that the female had not moved for five minutes, and that she was gazing at him in what can only be termed tense fascination. I crept slowly around to the far side of the table, and kneeling on the floor, looked at him from her viewpoint and level. There was from that moment no more doubt: His eyes were changing from green to black and back again at a frantic rate of speed. By the time I came round the table once more and looked with new understanding at the female, I realized she was putting Carmen Miranda's best efforts to shame. And that was one laboratory story that ended happily, for at this moment seventeen tiny green-eyed *Lyssomanes* are thriving on my desk.

Another problem we are trying to solve is the use, if any, of the various colors of the jumpers. Does a *xanthopa's* normally yellow mustache help him to win a mate or vanquish a rival? It seemed that the best way of settling the problem was to change the color and watch results. By trial and error we have worked out a system for inflicting painless disguises on unsuspecting spiders. The victim gets a quick whiff of chloroform and then, while held gently in a wisp of cotton under the microscope, he is given a completely new "make-up" with a tiny paintbrush and opaque water colors. Within a few minutes the spider wakes up, shakes himself a bit, and starts moving about. Within an hour or two he is usually courting and fighting with all the enthusiasm of his unpainted brethren. After some of my more striking efforts — for instance, the time I metamorphosed a plain black female into a jade green siren with touches of amarynth pink — I have felt cockily sure that bumbling old Nature had been surpassed.

However, the surprising result of all this has been that, in courtship, neither sex takes the slightest notice of my transformations. So long as the female is approximately the right size and shape, wiggles now and then, and has the odor proper to her sex and species, the male will find her glamorous, regardless of her appearance. Similarly, no matter what the color of a male's mustache — its normal yellow, or instead, red,

blue, purple, orange, green, gray or white — the female does not mind. Even when I deprive him of it altogether, gently shaving off the golden hairs with my finest scalpel, it makes no difference to the female. So long as he prances in the proper rhythm, rocking now and then from side to side, she will, in time, accept him gracefully.

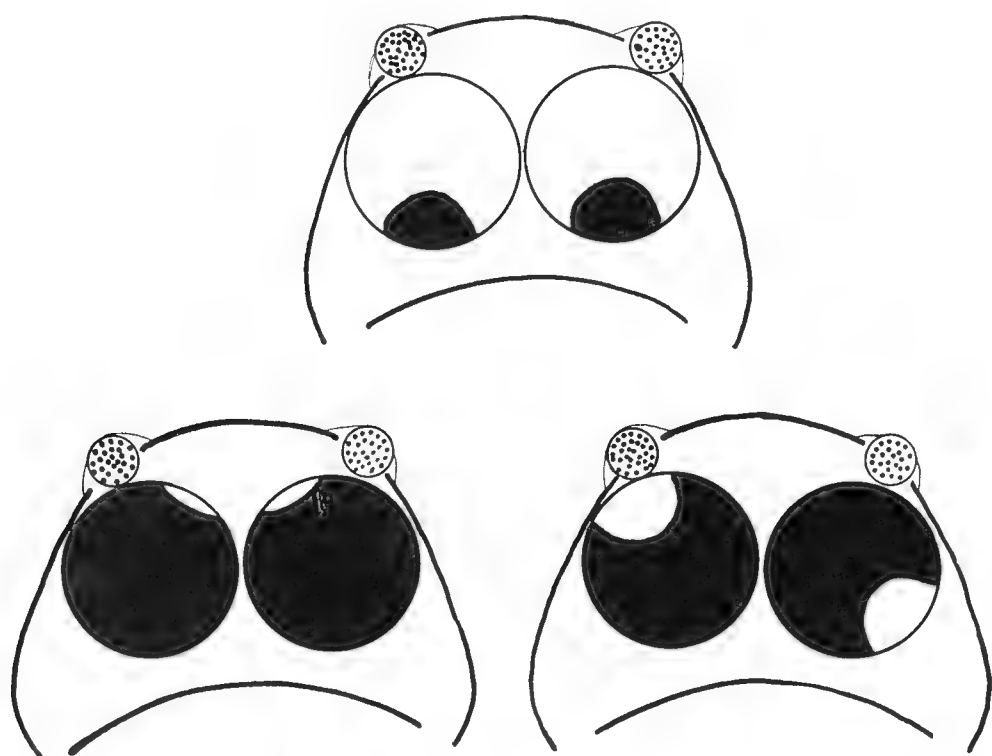
However, fortunately for our pet general theories of adaptation and natural selection, the yellow mustache has turned out to be an important badge of masculinity in the encounters between males. Battles in the *xanthopa* clan are all a sort of civilized bluff. Opposing males go through bloodless posturings, raising their six hind legs in a beautiful fan of poised fringes when they meet a rival face to face. Males with their yellow mustaches altered to orange or green were threatened just as were normal ones. But if the mustaches were altered to any other color—that is, to a hue further from yellow on the spectrum — the normal spiders either disregarded the monstrosity or treated it to a courtship dance. That happened, however, only so long as the painted male was still groggy from chloroform. One of the most amusing sights of the month was the apparent startled consternation of a normal male when the black-faced creature he had been energetically courting suddenly woke up and gave him a perfectly masculine threat display. The normal jumper at once stopped courting, and stared motionless at the horrid sight. Then he promptly turned tail and hid behind the microscope.

An especially interesting discovery has been that jumping spiders have “down” days as surely as human beings. Males, on their bad days, sit dully in the dumps and show no interest what-

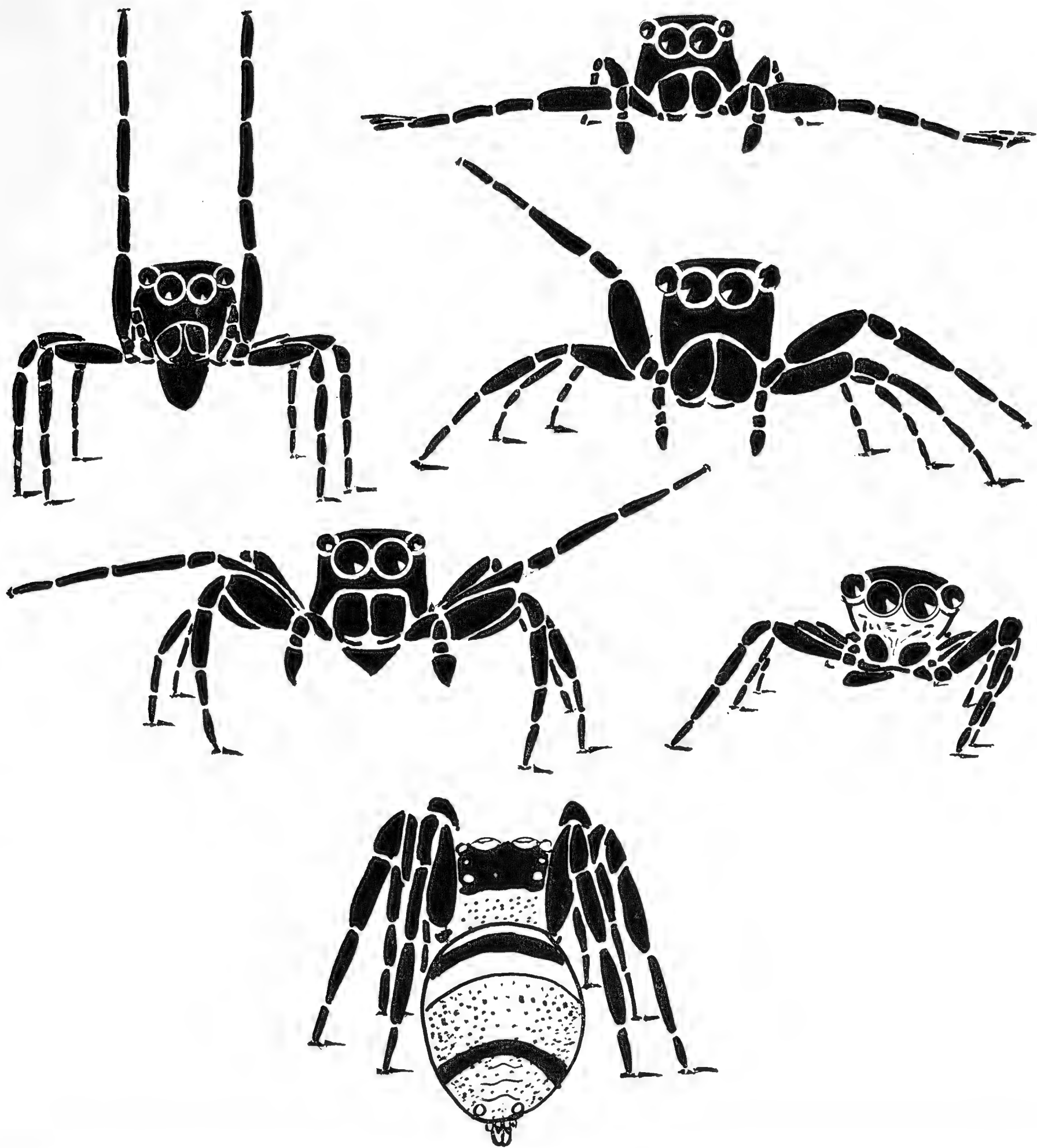
ever in either courtship or combat. Females who on the preceding day were politely attentive to courting males and of peaceful disposition generally, turn overnight into savage-tempered viragos, leaping at their small suitors with fangs unsheathed, or turning their backs so constantly on the hard-dancing swains that the latter eventually lose interest themselves. These moods recur, regardless of food, water, age or other economic and personal conditions in the life of the spider, and must be borne by the impatient experimenter with more or less philosophy. Anyway, as one of our staff has said, it is encouraging to know that even spiders get the blues!

The break-down of X51, mentioned at the beginning of these notes, was not caused by any mere periodic tantrum. X51 was in peak condition and a reliably normal personality. Except for his customary quota of down-days, he had breezed nonchalantly through three weeks of tests and several changes of color. At the moment, in fact, his mustache was a vivid orange. The unfortunate incident of the break-down occurred during tests to determine the value of two yellow stripes on top of the female's abdomen.

On the table lay the green oilcloth which is always used for determining distance reactions in our spiders. It is marked in black ink with a dozen concentric circles an inch apart. On the 10-inch line, which is about the limit of visual response in these particular jumpers, I placed two young females, about a third of a circumference apart. Each had molted to the adult stage only five days before and each was enjoying an up-day. However, while X18 flaunted the usual pair of yellow stripes, X32 had had hers black-



These are just three of scores of possible color shifts in the eye-region of a *Lyssomanes* jumping spider. The eyes change from green to parti-colored to black and back again. The change mechanism is little understood.



Five different kinds of Rancho Grande jumping spiders, all new species, at the peak of their various courtship displays. The fat spider at the bottom represents the general appearance of a typical female jumper. In this family, displays range all the way from a simple raising of two front legs to rather complex dances performed in a series of separate, distinct "steps."

ened out. In the exact center of the circle I placed good old X51.

He responded at once. First he caught sight of black X32, but at the same instant normal X18 wiggled, and he looked toward her. Before he had well started a courting approach-stance, X32 began grooming a leg, and his attention was once more drawn her way. This sort of thing went on for the next ten minutes, while the male approached along the midline between them, zigzagging first toward one, then toward the other. By the time he reached the six-inch circle,

when their odor must have been reaching him strongly, his palps were flagging up and down excitedly. But still he did not choose to court one alone. Finally, at the eight-inch line, exactly mid-way between them, he stopped dead and looked from one to the other and back again, like the proverbial donkey between two bales of hay. And it was at this instant that he whirled around and jumped out of the window. I hope that wherever he is, he has found a placid niche among his fellows, orange whiskers and all. He has earned it.



From Little Monster To Resplendent Beauty— That's the Tiger Swallowtail

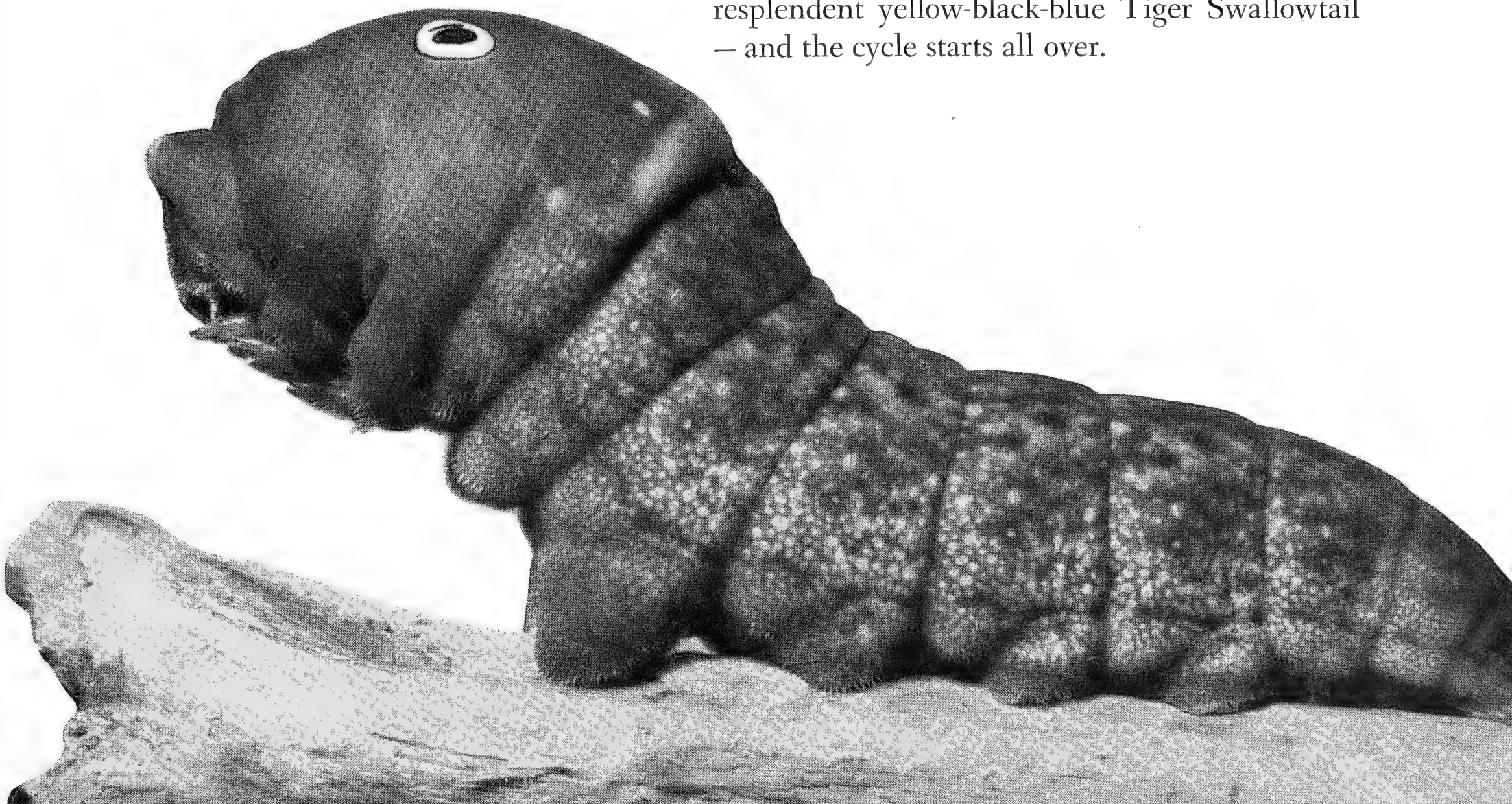
By BRAYTON EDDY

THE GROTESQUE CREATURE at the bottom of this page (and on the cover of this magazine) is the caterpillar of the Tiger Swallowtail Butterfly, largest of our common butterflies.

The little monster that gazes so soulfully at the gorgeous butterfly that it will, in a few weeks, become, is not actually gazing at all—at least, not with the seeming “eyes” in the top of the thorax. These are simply greenish-yellow so-called eyespots, edged with black and enclosing a black-and-blue false pupil. In front of them are the

openings for two fleshy orange “horns” which give off a nauseating odor when they are thrust forth. The true eyes are much lower down, on the head, in the vicinity of the chewing mouth-parts.

The Tiger Swallowtail on the opposite page will deposit its eggs one by one on the leaves of such trees as wild cherry, ash, poplar, apple and shadbush. In about ten days they will hatch and the caterpillars will reach the stage represented here in about three weeks. Then comes the tough-shelled chrysalis stage and from it emerges the resplendent yellow-black-blue Tiger Swallowtail—and the cycle starts all over.





Moulin Studios, San Francisco

These magnificent animals are representatives of the last surviving herd of Roosevelt Elk, now given protection in the Madison Grant Forest and Elk Refuge in Humboldt County, California.

The Madison Grant Forest and Elk Refuge

MADISON GRANT was one of the founders of the New York Zoological Society and in various capacities, as Secretary, Vice-president and President, he helped to form and guide it from 1895 until his death in 1937. Long ago the Society paid tribute to his share in the creation of this institution; a bronze bust of Madison Grant stands in the Zoological Park's Administration Building, and a portrait of him adorns the Members' Room.

Now another phase of his career, as Conservationist and lover of primeval forests, has been splendidly celebrated on the other side of the United States. In Prairie Creek Redwoods State Park, near Orick in Humboldt County, California, a redwood forest tract of 1,600 acres has been dedicated in memory of Mr. Grant, as the

habitat of the last surviving herd of Roosevelt Elk in California. This magnificent animal, *Cervus canadensis roosevelti*, was named by Merriam, in 1897, in honor of Mr. Grant's friend, Theodore Roosevelt.

A commemorative dinner was held on July 29 in San Francisco, celebrating also the thirtieth year of activity of the Save-the-Redwoods League of which Mr. Grant was a founder. The Madison Grant Forest and Elk Refuge was established as a memorial by DeForest Grant, John D. Rockefeller, Jr., Archer M. Huntington, the Zoological Society, the Boone and Crockett Club, the National Audubon Society, the American Wildlife Foundation, the Save-the-Redwoods League and the California State Park Commission.

News from the Conservation Foundation

Fairfield Osborn Speaks on Town Meeting of the Air

SPEAKING TO THE TOPIC, "What Hope for Man?" Fairfield Osborn, president of the Zoological Society and the Conservation Foundation, took part in the four-man panel discussion on the Town Meeting of the Air in Washington on September 14. This symposium, held in Constitution Hall before an audience of several thousand, marked the closing of the centenary meeting of the American Association for the Advancement of Science. In the audience were scientists from all over the United States.

The other participants in this significant program were Dr. Brock Chisholm, director general of the World Health Organization; Dr. Harlow Shapley, director of the Harvard College Observatory; and Dr. Edmund W. Sinnott of the Sheffield Scientific School of Yale University. The discussion was broadcast over the ABC network. Prof. Stanley A. Cain of the Cranbrook Institute of Science of Bloomfield Hills, Mich., summed up the discussion.

Mr. Osborn said in part, as reported in the New York Times: "Hope for the future of man rests primarily therefore upon whether he realizes before it is too late that the maintenance of the earth's fertility is essential to his survival; further, that there is a limitation to the number of people that the earth is capable of supporting.

"As matters stand today, these two stark truths, never too clearly recognized in the course of human history, have been almost totally obscured by the dazzling triumphs of materialism and industrialization.

"We are bouncing radar beams off the moon at a time when we are gradually reducing our own world to the condition of sterility of that romantic planet. We have seemingly discovered the secrets of the universe but we have not as yet persuaded ourselves that we must adhere to the principles that ensure the existence of all living things, man included."

"Living Earth" Films Exceed Sales Expectations

It is perhaps too early to count our chickens, but according to the distributors, Encyclopaedia Britannica Films, Inc., the first group of four motion pictures produced and released by the Conservation Foundation — the "Living Earth" series — may sell far beyond the number originally estimated for this year. It is reported that the Los Angeles Board of Education for example has ordered some thirty-two sets, or 128 films, for use in the public schools there. For the benefit of those unfamiliar with the sale of educational motion pictures, this may be said to be an unusually gratifying order. It is to be hoped that the current short supply of film-making materials will not retard the distribution of this series.

C. W. Mattison of the Division of Information and Education, United States Forest Service, reports that the Living Earth Series was shown to the Forest Service in Washington on September 9 and 10, and he states that in his experience no set of films has received such unanimous favorable comment from all present. Mr. Mattison telephoned his congratulations to the Foundation on this achievement.

The Foundation's so-called Impact film, a condensation of the Living Earth series, will be ready for distribution this fall if working schedules can be maintained.

John Storer, the photographer of the Living Earth series, has thus far this year produced 10,000 feet of good film in preparation for the Living Forest series, the second group of pictures to be released by the Foundation at as early a date as possible in 1949.

Snider to be UNESCO Representative at Inter-American Conference

Robert G. Snider, administrative officer of the Foundation in charge of research, was appointed the official representative of UNESCO at the

(Continued on Page 159)

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM
AND THE DEPARTMENT OF TROPICAL RESEARCH

Tiger Reunion: Princess Rejoins Her Family

By LEE S. CRANDALL

INTEREST in young animals is paramount among Zoo visitors of all ages. We try, of course, to satisfy the demand but our greatest successes seem to have been scored with Tiger cubs. There may very well be more satisfying animal babies but if there are, we haven't yet produced them.

The birth of Dacca's three cubs on May 4, 1948, caused almost as much excitement as that of Dacca herself, with her two brothers, more than four years before. But curiosity had to be curbed until July, when the family made its appearance in the great outdoor cage at the north end of the Lion House. From the first day outside, mother and cubs established themselves as one of the most attractive exhibits we have ever had. As play grew more and more rough, Dacca often sought relief from infantile teeth and claws by leaping up to the cool rocks that form the background of the cage.

Soon after noon on July 23, Dacca dozed too long in a patch of sunshine on the cage floor. The cubs, tired of playing with each other, made a concerted rush at their recumbent mother. Dacca, startled from her half slumber, leaped suddenly to her feet, scattering cubs in all directions. Somehow, in the excitement, little Princess, the only female in the litter, was injured.

Examination by Dr. Goss revealed no apparent damage but the X-ray disclosed a "green stick" fracture of the left femur, extending nearly its full length. There was nothing to do but remove the cub to Mrs. Martini's nursery, where care and quiet would be assured. Healing progressed well and it was decided that on August 21 we should

attempt re-introduction to the family group. Elaborate plans were made. The electric eel, just across from Dacca's indoor cage, a source of constant annoyance to the tigress, was temporarily blocked off. Neighboring animals were shifted to make plenty of room. Mrs. Martini was to



Herald Tribune—Fein Photo

Dacca and Princess Reunited.

carry out Princess, allow Dacca to see and smell her through the cage wire, then place the cub in an adjoining empty cage and let Dacca in. We thought Princess should be firmly established with her mother before meeting her brothers.

It was a lovely plan but like so many others, it didn't work. Little Princess, perhaps infected by our own excitement, had become so intractable that even Mrs. Martini was unable to quiet her. In a quick shift of plan, the cub was induced to leave her connecting cage in the Nursery and enter Dacca's den. From this, however, she firmly refused to budge, so that there was nothing to do but let Dacca into the cage and hope for the best.

The proverbial pin might have dropped, as we watched Dacca stalk through the opened door. She paused, sniffed and went directly into the den. After a few seconds of suspense, she came out again, her pace accelerated, in her eyes a

tigerish gleam of excitement. And rushing eagerly after her came little Princess, no longer conscious of the silent crowd, intent only on the mother from whom she had been separated so long.

It was a dramatic moment. Princess was obviously anxious to re-establish relations on the old playful basis, the only one she knew. Dacca, in her absence, had more than half convinced Princess's brothers that extreme familiarity was no longer permitted. It was evident that while Dacca would willingly accept Princess, there was a lesson to be taught first. To prevent the admonitive cuff, doors were quickly opened, leading to the outside cage where the brothers were waiting impatiently. Any fears we may have had never reached maturity, for little Princess was instantly part of a rolling, scrambling mass of baby tigers. When they finally untangled themselves, reconciliation was complete and Princess was again one of the family.

Department of Tropical Research Returns from Rancho Grande

THE Department of Tropical Research of the Zoological Society has just returned from its forty-seventh expedition after six months in the eastern Andes of Venezuela. For the third year William Beebe, Jocelyn Crane and Henry Fleming maintained headquarters at Rancho Grande, 3,500 feet up in the middle of a subtropical jungle. The main activities of the three seasons may be designated as first, exploration and preliminary study; second, collecting and observation, and third, intensive investigation of definite problems.

Among the latter several stand out: the wholesale migration of birds and insects through Portachuelo Pass, phenological study and record of the climaxes of blossoming and breeding of dominant floral and faunal types; comparative studies of jungle societies; and relations between instincts, sense organs and behavior in certain organisms.

Aside from these and other direct results of scientific study, several important by-products have come about in the field of inter-relations with the Venezuelans themselves.

Along the line of our constant hopes and endeavors, the President and Congress of Venezuela

have at last passed a law setting aside Rancho Grande as an *Instituto Internacional de Ciencias Naturales*. The climax of this achievement is due to the energy and enthusiasm of Dr. Henri Pittier, the ninety-one-year-old dean of Venezuelan botany. The Department's laboratory, along with all the rest of the great Rancho Grande building and the surrounding untouched jungle in the *Parque Nacional de Aragua*, is now a biological station for the use of Venezuelan and foreign scientists and students.

The second thing in which the Department may take some pardonable pride is the translation and republishing of the elaborate "Ecology of Rancho Grande" by Beebe and Crane, as it appeared in *Zoologica*. This will now appear in Spanish as an entire number of the *Boletín de la Sociedad Venezolana de Ciencias Naturales*, the scientific journal established by William H. Phelps. Fifty thousand copies are being printed for distribution to Venezuelan governmental departments and schools, as well as to other institutions in South America.

Thirdly, a twenty-six-minute color film of animal life, the pick of reels taken by Miss Crane, has been assembled, provided with Spanish sound track and an introduction by Dr. Beebe. Numerous copies of this will be distributed both in Venezuela and other Latin American countries.



Rancho Grande from the Air.

The continued generosity of the Creole Petroleum Corporation has made possible this latest expedition, as well as the Spanish editions of the "Ecology" and of the motion picture film.

It is one thing to carry out a scientific expedition in a foreign country. It is much more a matter of congratulation when, in the course of

such work, firm and lasting friendships are formed, and especially when permanent contributions are made to the cultural life of that country, the influences of which may persist for many years.

Amateur Movie Contest

Because they have a specific interest in animals, Members of the Zoological Society should be interested in the American Humane Association's efforts to promote amateur motion pictures that will further a love of animals, give instruction in their care, or create a friendly, kindly, constructive interest in them. Announcement has been made of the fifth annual competition for amateurs, with a prize of \$200 for the best picture and additional prizes if the entries warrant. Details may be obtained from the American Humane Association, 135 Washington Avenue, Albany 6, N. Y.

The Death of Betty, One of Our Duck-billed Platypuses

Betty, one of our three Duck-billed Platypuses, was found dead on September 6. She had lived in the Zoological Park one year, four months, and eleven days and was believed to be about two years and eight months old.

Cecil, the male Duck-bill, and Penelope, the other female, continue to be in apparent good health.

The intense cold and heavy snowfall of last

winter and the record-breaking heat wave of late August, when the mean temperature for the 26th, 27th and 28th was 90 degrees and the mercury reached almost 101, were apparently responsible for the decline in Betty's condition. Last winter it was impossible to have crayfishes flown to New York from Louisiana for a period of two weeks, and earthworm supplies ran short. Penelope, who was Betty's tankmate in their winter storage quarters in the basement of the Bird House, was larger and stronger and got a major share of the earthworms. Consequently, it was noticeable this spring, when the Platypuses were put on exhibition on May 9, that Betty was not as fat as she had been last fall, and not as active.

During the heat wave, Betty was listless and did not eat with regularity. She skipped feeding for several days and on September 3 Keeper John Blair took her off exhibition and returned her to the winter quarters, hoping that quiet and coolness would restore her appetite. However, she did not feed, and died two nights later.

Betty, Penelope and Cecil were brought to the Zoological Society on April 25, 1947, by David Fleay, the Australian zoologist. They had been captured in April, 1946, in the streams near Healesville, Victoria, Australia, and Betty was estimated to be about 4½ months old at the time of capture.

Since they went on exhibition on April 29, 1947, for the summer months of last year and this, the Duck-billed Platypuses have been seen by approximately 250,000 visitors.

New Members of the New York Zoological Society (Between July 1 and August 31)

Life

Mrs. Grace Busche Dafoe

Contributing

Mrs. Albert Andriesse
Dr. F. L. Babbott
Paul H. Cheney
F. Russell Crawford
C. W. Force
John L. Given, Jr.
W. Hunting Howell
Mrs. Wayne Johnson
Henry F. Keil
Mrs. Bertha Mack

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Annual

William B. Adams
L. M. Bartlett
Paul L. Boulard
Miss Kathryn E. Brown
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Seymour Eckstein
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William Hawker
H. Rogers Hopkins
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Sam Shain

Norman I. Stotz

Richard I. Topus

James L. Townsend

Col. George F. D. Trask

Richard Turnbull

Mrs. Richard Turnbull

C. R. Vose

Conservation News

(Continued from Page 155)

Inter-American Conference on Conservation of Renewable Natural Resources held in Denver, Colorado on September 7 to 20 last.

At this same conference, President Osborn made the principal address before the panel on the Dynamics of Renewable Resources. George E. Brewer, Jr., addressed the panel on Education in Conservation Dynamics at the same meeting.

The Inter-American Conference was well attended not only by leading conservationists from all over the United States but by many Latin-American delegates.

Notes

Elmer Davis and Quincy Howe recently de-

voted large proportions of their network programs to radio reviews of "Our Plundered Planet" by Fairfield Osborn.

* * *

"Our Plundered Planet" will appear soon in an English edition. Negotiations are in progress or inquiries have been received in reference to the translation of Mr. Osborn's book into Italian, Swedish, French and Icelandic.

* * *

George E. Brewer, Jr., left on September 22 to attend the meetings at the International Union for the Protection of Nature in Paris. He expects to meet with the European and British members of the Foundation's Advisory Council before his return.

Publications of Interest

ROAD TO SURVIVAL. By William Vogt. 335 pp., 8 figs. William Sloane Associates, New York, 1948. \$4.00.

INEVITABLY the thoughts of far-seeing men find the same channels. It was no casual coincidence, therefore, which provided in so brief a space of time two outstanding books in the same vein — William Vogt's *ROAD TO SURVIVAL* and *OUR PLUNDERED PLANET* of the Society's President. Differing in character and in their approach to the same problem, there is nothing unfortunate in their nearly simultaneous arrival, for they are complementary. They are also symptomatic of the gathering forces of that great movement, now forty years old, in which the Society, already having played a distinguished part, has assumed new and far-reaching responsibilities.

It is a movement which has outgrown its name, for Conservation is a word so wide in its implications and yet so limiting in use as almost to have become meaningless. It is to every individual a different thing. To the farmer, it is a whole soil technique; to the woodsman, use on a sustained yield basis; to the sportsman, more game to kill. To this one, it is the salvation of the Wood Duck; to that, of the Pink Lady's Slipper.

In the modern sense Conservation is indeed all these things and much more besides. It is a philosophy and a system of ethics. It is mankind's humble, if tardy, acknowledgment of himself as another biological specimen in the world of living things and his admission that he is only a part of his environment and in no way superior to it. It is an understanding of what Vogt calls "the total ecological situation" without which he claims the human race cannot escape that limbo of unthinkable misery into which it is rapidly sinking.

But why, one may ask, the urgency? Man has lived on this planet for a substantial number of years. In that time he has steadily clawed his way upward, materially, morally, and intellectually, and always, if one may judge by the wreckage, in happy disregard of ecological patterns. Indeed, no one seems to have consid-

ered the necessity for such a word until the turn of the century. There were pessimists, of course. A hundred and fifty years ago, did not Malthus sound the trump of doom? And today, do not infinitely more people live longer and in far greater comfort than they did then? On a world scale, the pattern has been one of luxuries becoming necessities for more people, be it rich and exotic out-of-season foods for me, cigarettes for you, and the used Sunday comic sections for some simple savage on the other side of the world.

Malthus and his painstaking mathematical calculations of population and production are discredited and his arguments have become meaningless for the very reasons which provided for the evolution of those bigger and better machines for taking the cream off this planet. Yet somehow, in the main, his conclusions show an annoying tendency to stand. His was an honest, even courageous, attempt to cast up the ledger, but the facts were not all in. Man today could produce a reasonably accurate balance sheet, if he wished and if he dared. It is this which Vogt insists he must do as a first step along the onerous *ROAD TO SURVIVAL*.

Despite the enormous complexity of the problem — the multiplication of people and the squandering of the resources on which they must live — Vogt succeeds in making his attack on it as simple and intelligible as it is direct. His method is as subtle as a riveting machine and about as inescapable. The result is not a pleasant book to read, nor was it intended to be. One does not turn to such literature (for it is that, no less) for solace.

It is written in a fine cold anger. The emotions are controlled for Vogt is too good a scientist and writes too well to let such things get the better of him. They are his tools and he uses them with a persuasiveness which is odd in one who paradoxically allows his obvious love of men to overcome his ill-concealed contempt for man.

The lashing man receives is perhaps what he deserves and any brief flash of tenderness is reserved for wildlife and particularly for birds for whom he has unbounded

affection. He can pause, whip in hand, to turn a poignant and nostalgic phrase for them among the harsh blows of his words, "We shall never again hear the music of the Eskimo curlew and with its lost song has vanished a Mozart of the prairies; we shall never be so rich again as before its passing." Unhappily, this is not the end. On this very day, for instance, comes the news that hope can now be relinquished for the survival of the Whooping Crane whose resonant call must soon be numbered among the dimly remembered things. A miracle, they say, might save the species but miracles need faith and that, as a subject, is no longer in educational curricula even in a year which will produce a record of thirty-two million students.

In all, Vogt's is a macabre tale grimly told, as in geographical order the continents and countries of the world are paraded for inspection in wretched procession. None escape — this richest least of all — whose inhabitants and their honored forbears are described as "The most destructive group of human beings who have ever raped the earth. They moved into one of the richest treasure houses ever opened to man and in a few decades turned millions of acres into a shambles. . . ."

Vogt makes no bones about which is the ROAD TO SURVIVAL. It is an austere route to which he points and the prospect of austerity and asceticism are never engaging. He echoes Micawber but in more elaborate terms — "Ecological health for the world requires above all two things: (1) That renewable resources be used to produce as much wealth as possible on a sustained yield basis. . . . (2) We must adjust our demand to the supply, either by accepting less per capita (lowering our living standards) or by maintaining less people. Since our civilization cannot survive a drastic lowering of standards, we cannot escape the need for population cuts."

Let us, however, go further than that and say flatly that any lowering of the world's standard of living is unthinkable. In vast areas of the world, famine is endemic. The Indian of India and of South America, the Chinese, the African — all are living on the edge of starvation if not over it. Even in this country today one-third of the people are reported to be undernourished. If there is any lowering of standards, it is these people who will take it first — not the butcher, the baker, and the candlestick maker, on seventy dollars a week. But inevitably their turn will come — when there is no more flour to bake and meat and tallow are simply not to be had.

We who have the luxury of leisure to look around and think a little believe we recognize the means by which the program might be carried out. But what of those who have no release from the effort merely to survive and whose whole energy is spent in the business of finding not only enough but merely something to eat? That is where the initial inertia lies. It requires leisure for the imagination to work and energy to lift the eyes even as far as the horizon.

Inventory — Knowledge — Education — Action. In logical sequence Vogt spells out the four-pronged attack in which every individual in the world must share. It was Aristotle, however, on whose ancient head is rather unfairly heaped all the wrath of Vogt the semanticist, who produced the final dictum with which no one could possibly quarrel. "In practical matters, the end is not mere speculative knowledge of what is to be done but rather the doing of it." Thus in the many cases where

inventory and knowledge are sufficient, action need not be delayed for their exact completion.

There are cultural patterns and religious beliefs to change beside which the economic and political difficulties in distribution of such small surpluses as there may be pale into insignificance. Millions of Hindoo cattle are kept alive for religious reasons, hopelessly unproductive and a burden to the land. Men breed in a frenzy so that there may be descendants to pacify their manes when they themselves have become ancestors. Bride prices are named in terms of cattle and the vastly destructive goat, thus starting a whole other chain reaction. The taungya cultivator receives unmistakable warning from the spirits who infest the earth, the air, and the trees when it is time for him to desert his clearing and burn anew.

Vogt, who has seen illiterate Andean Indians religiously brush their teeth twice a day, is confident that any cultural pattern can be changed by education. Perhaps, he is right. Perhaps, even the American people can be taught that sewage is not a horrid word and that its waste is as criminal as the sacrifice of crops on the altar of price support. — A. WILLIAM SMITH.

STRANGE PREHISTORIC ANIMALS AND THEIR STORIES. By A. Hyatt Verrill. 262 pp., 92 illus. L. C. Page & Co., Boston, 1948. \$3.75.

The indefatigable Mr. Verrill (this is his 106th book) blends fact and fantasy, modern science and myths, in another of his "Strange Stories" series. The scientist will be stricken by the hodge-podge, but the average layman will find it engrossing. — W. B.

DESERT ANIMALS. By Rita Kissin, illustrated by Helene Carter. 28 pp., each page illustrated. For ages up to 8 years. David McKay Company, Philadelphia, 1947. \$2.50.

Children nowadays certainly absorb their natural history painlessly — and not only about such familiar fauna as Elephants, Lions, Tigers and Giraffes. The desert animals of the Southwest are mostly small and unfamiliar — the Bassarisk, Chuckawalla, Kit Fox, Elf Owl, Horned "Toad," Iguana, Kangaroo Rat, Uta, Ocellated Lizard, for example — but here they are in soft colors, in their natural setting, with a short, informative, rhyming text about each. The child who absorbs Miss Kissin's text and Miss Carter's spirited drawings will have an amazingly broad knowledge of desert fauna and perhaps will be able to put a name to some creatures that would stump its parents. — W. B.

POISONOUS DWELLERS OF THE DESERT. By Natt. N. Dodge. Popular Series No. 3. Southwestern Monuments Association, Santa Fe, New Mexico, 1947. 44 pp., 28 illus.

This is a ready reference pocket guide to poisonous animals of the great Southwest. Some of the species discussed are also resident in other sections of this country. They include venomous snakes, the Gila Monster, centipedes, scorpions, spiders and a few insects.

Thumbnail sketches are given of first aid treatment, control of dangerous invertebrates, and how to prevent being bitten or stung. Common superstitions or misunderstandings are debunked. No attempt is made to furnish keys for scientific identification of species.

The Southwestern Monuments Association and the author are to be congratulated upon compiling such a reliable and convenient booklet for popular distribution. The illustrations are adequate and well-chosen. — BRAYTON EDDY.

Attention, Members!

THE ZOOLOGICAL SOCIETY still needs members. And we need the help of our present members in securing new ones.

Will you please, when you think of it, call this fact to the attention of your friends who might like to join: *Anyone who loves animals or who has an interest in any one or more of our many fields of activity is eligible for membership, and his modest support, in the form of dues, is greatly appreciated.*

Our members have in the past helped us greatly in bringing our rolls to their present maximum strength. We hope you will continue to give us this vital aid.

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30 East 40th Street

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ANIMAL KINGDOM



THE MAGAZINE OF THE NEW YORK ZOOLOGICAL SOCIETY

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ANIMAL KINGDOM

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Christmas and Science

AT THIS SEASON when our thoughts are drawn most closely towards the *essence* rather than the *practice* of living there is no reason to feel that the concepts of science detract from the glory of the ineffable hour. There are those, it is true, who, in the name of science, assert that we live in a purposeless and meaningless world. It is of our own choice whether we accept such assertions. Scientific thought leads to no such finalities, for the sphere of its interest lies primarily in causes rather than in purposes.

Whether one is a scientist or no the acceptance of the concept of a universal design or the interpretation of the essential meaning of life stems forever and gloriously from the individual, whether you, me, or Professor X. Many a man, in various fields of present-day science, has declared his abounding faith in a divine purpose. The biologist, Hans Zinsser, wrote: "Of all the living things on earth, mankind alone is born a 'why' upon its lips. This 'why' has been the source of science and religion. No conflict should exist between the two. The problems of the one cannot be solved by methods of the other. Science cannot extend to primal cause." The astronomer, Sir Arthur Eddington, stated: "... the scientific world of pointer readings would be an impossible sort of place to inhabit. It is a symbolic world and the only thing that could live comfortably in it would be a *symbol*. But I am not a symbol; . . ." The thoughts expressed by the bio-physicist, Lecomte du Noüy, in his recent books "*Human Destiny*" and "*The Road to Reason*," will repay all the contemplation we may give them.

In effect, the question is not whether there is a purpose but whether we are capable of understanding it.

Fairfield Osborn

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DEC 23 1948



The young Moose and a White-tailed Deer are always sure that in their accustomed feeding place they will find plenty of food, even in snow.

The Snowy Season

By LEE S. CRANDALL

CHRISTMAS is traditionally a time of sparkling snow and tingling cold. In New York these conditions do not always prevail, but when they do, everyone is presumed to respond with joy and gaiety. Whether or not all of our citizens, especially motorists, react as prescribed, is problematical. But for the animals in our Zoological Park, there is no problem. The hardier creatures greet the drifting snow with obvious delight. Those not equipped for withstanding the rigors of winter are snugly housed in heated quarters, safe from storm and cold. For them, seasonal changes pass unnoticed.

The Keepers who must see that proper conditions are maintained may not always be as happy as their charges. In periods of heavy snow, there is much wielding of shovels and beating of paths, to make certain that food supplies will reach outlying installations. Even those who work indoors are not free from worry, for shortages of food or fuel could quickly result in irreparable losses in the collections.

Then there are the intricate questions as to which animals are to remain out of doors and which must have warmth and shelter. Everyone knows that Polar Bears and most kinds of Penguins live in cold regions near opposite poles and that they are happiest when temperatures are low. It is almost equally evident that tropical species, for the most part, must be kept warm in winter. There are many unexpected exceptions to this rule. The Caracaras or Carrion Hawks, found from Florida to the hot lowlands of South America, are indifferent to cold. The Emu of

Australia and many of the Cockatoos and Parakeets of the same continent, are among the hardiest of birds. The Ostriches of Africa, in spite of seemingly inadequate plumage, enjoy rambling in the snow and require only unheated shelters at night. The Dromedary, "Ship of the Desert," is equally happy as a ship of the snow, if sheltered from the strongest winds.

Oddly enough, the greatest difficulties are presented by the inhabitants of temperate regions. Most of the mammals and many of the birds are perfectly hardy. But many migratory birds, such as our own Orioles and Tanagers, cannot endure low temperatures. Group distinctions will not always stand, for while the Hermit Thrush will winter safely without heat, its close relatives, such as the Wood Thrush and the Veery, are unable to do so.

Once these problems have been reduced and satisfactory dispositions made, necessary food adjustments must follow. Fortified by the fat supplied by additional mackerel, the California Sea Lions plunge with customary abandon into the icy waters of their outdoor pool. Cod liver oil supplies Vitamin D to those creatures receiving only glass-filtered sunlight. A little added corn meal keeps wintering Moose glossy-coated and content.

These are but housekeeping details, of small moment compared with the beauties of the Zoo on a snowy Christmas. A Golden Pheasant cock tripping lightly over the drifts, the tracery of deer paths in a field of white, are ample compensation for the green warmth of summer.



The White-necked Cranes of eastern Asia and Siberia are perfectly at home in a New York snowfall, although they have shelter from rain.



Disconsolate as it looks, this Reindeer does not really mind the pelting snow, for in its northern home the winters are much longer and harder.



As snow and ice close in the ponds in the Zoological Park, wintering wild Black and Mallard Ducks flock to open water and feeding places.



Christmas Day in far-off Yunnan, when Dr. Beebe was gathering material for his "Monograph of the Pheasants." Notes for this article were extracted from the journal he is writing here.

A Pagan Christmas in Yunnan

By WILLIAM BEEBE

NINETEEN HUNDRED AND TEN YEARS after the first "Mass of Christ" I awakened in a small tent in the heart of Asia; more exactly in north-western Yunnan, on a wild hillside, near a cluster of Kachin huts which called itself Sin-ma-how.

It was early morning and bitter cold, for the sun was still behind the ridge of the eastern Himalayas. The day began in a pleasant pagan way, for the canvas flap was shaken and a small voice called out, "Salaam Sahib; baath ready, chow coming, chit here from Major Sahib." It was the voice of Aladdin, my ever-smiling Number One Boy. He had, alas, no magic lamp and so my "baath" turned out, as usual, to be only a tin basin filled with icy water. Up the slope toiled Mohammed the cook, with hot dishes. A villainous scowl never left his face, but his waffles and collops were beyond praise, and as to the latter I was in full accord with Pepys.

The first thing to catch my eye was a mushroom growth, a group of small, split bamboo, music racks, or so they seemed. My Gurkha guard said they were erected during the night by the very pagan Kachins from the distant huts. They were intended as propitiating rest places for the nats or evil spirits which, it was certain, must be my familiars. I started at once breaking commandments, with Number One, at least by acquiescence, for I carefully left the unchristian idol seats undisturbed, and thereby acquired much merit in the eyes of all Sin-ma-how.

There was a frost of snow on the distant mountains but around me wild cherries were in full bloom, and bulbuls were singing as I started out. The morning was a lucky one, for I began my tramp along a pheasant trail, a regular route to water, and intercepted sixteen splendid silver kaleege pheasants, spread out in a short curve,

chuckling to themselves as they feasted on grubs and acorns. After many satisfying minutes of watching, in the distance a junglefowl crowed, and then a laughing thrush discovered me. From a dozen throats there arose a deafening chorus of wild screams and guffaws, an interruption which brought Commandment Number Three crashing around my ears. When the alarm had passed and I had acquired an unpleasant assemblage of ticks, I slithered down through dwarf bamboo, shot three of the birds, and got photographs of their surroundings. Luck continued to be with me, for on my return trip no water buffalo crossed my path. Laden as I was with gun, camera, glasses and dead pheasants, sudden escape up a tree would have required more simian ability than I possessed.

The afternoon list of casual visitors might have stepped full-fledged out of the Arabian Nights. First came the friendly Chinese headman of the village, followed by his wife hobbling pitifully on her bound feet; later a Lishao matron sauntered up with her head projecting through a tangle of dozens of wire and bead hoops, and a wholly mongoloid baby asleep on her back. Next came a fat Kachin maiden, apparently the belle of the village, ears distended with enormous and very beautiful turquoise and silver ornaments. The Tenth Commandment tottered, but my covetousness was to no purpose, for she would not part with the jewelry for any offer of rupees. A sad, ragged, spear-laden man of unknown tribe

squatted motionless for an hour while I skinned pheasants. A week later we found him a short distance away, where he had been killed by a leopard. Most pitiful of all was the last of a group of insane boys driven out of the village, who, until he too disappeared, subsisted on the garbage thrown away by Mohammed.

The strangest visitor was a gift from the above-mentioned English Major, who, a few miles away, was in charge of a column of the 96th Punjabis. Aladdin led a little creature, tethered on a cord, fuzzy, black-masked like a panda, with a dorsal stripe and groping little fingers. It was a humble member of the lemurs — a slow loris. Its life was wholly deliberate, its mentality low, and it completely outwitted us and within twenty-four hours vanished into the jungle.

At twilight all seemed supremely peaceful as I looked down the valley from the tent door, and watched our luggage elephant swaying in his ropes, and the Chinaboys watering the mules. Yet at that moment my favorite horse boy was dying from no possible cause that we could ever discover, except the unalterable conviction on the part of himself and his brothers that his time had come. Later, from my cot, I heard an occasional tinkling, and on another night found the sound was caused by spent poisoned arrows, shot from a cross-bow out of the darkness, striking against the canvas and making a pair of crossed Kachin swords jingle as they swung. Christmas in Yunnan had its drawbacks as well as its joys.



"It was a humble member of the lemurs — a slow loris."

101 Animals of the Bible

By BRAYTON EDDY

EVEN NOW there is the vivid recollection of his long fingers groping for the woven bookmark inserted between the yellowed pages of the Great Book. It lay on a marble-topped table at one corner of the bleak parlor and was lighted by a kerosene lamp held in a wall bracket. In it were recorded the names of grandfather, and his grandfather, and all his kith and kin down to the present. For the Family Bible of those days was more than a sacred book. It contained the vital statistics of five generations with space for many more entries.

Slowly the ponderous volume was opened at the precise spot where reading aloud had ceased the night before. A heavy hand caressed the printed page as we children settled back, in duty bound, to listen. Grandfather would not skip a passage, no matter how dull, but his story of Noah and the Ark gave promise of real excitement. It was Christmas eve and the wind howling outside furnished sound effects which sent the Ark tossing in our youthful imagination, hither and yon, as it strove to ride out the storm with its strange cargo.

"Every beast after his kind, and all the cattle after their kind, and every creeping thing that creepeth upon the earth after his kind, and every fowl after his kind, every bird of every sort." Gen. 7:14

This was my introduction to the animal kingdom. The Great Book means many things to many people and specific things to some people. To the litterateur it is a source of great prose and poetry, to the historian a chronicle of past events, to the theologian a guide to spiritual unfoldment, and to the zoologist a primer of early animal life.

Granted that the Great Book is the product of many minds over many periods. That it is a compilation of inspired writings by authors whose identity has often been lost and whose original manuscripts have for the most part disappeared. And granted that in translation the names of some animals have been hopelessly garbled; nevertheless, in the King James and American Standard versions of the Old and New Testaments there are found the names of 101 animals which can be identified with some degree of accuracy. It is interesting to note, at this Christmas time, that 67 of them have been exhibited at our park within the past year; and just where they are mentioned in the Bible.

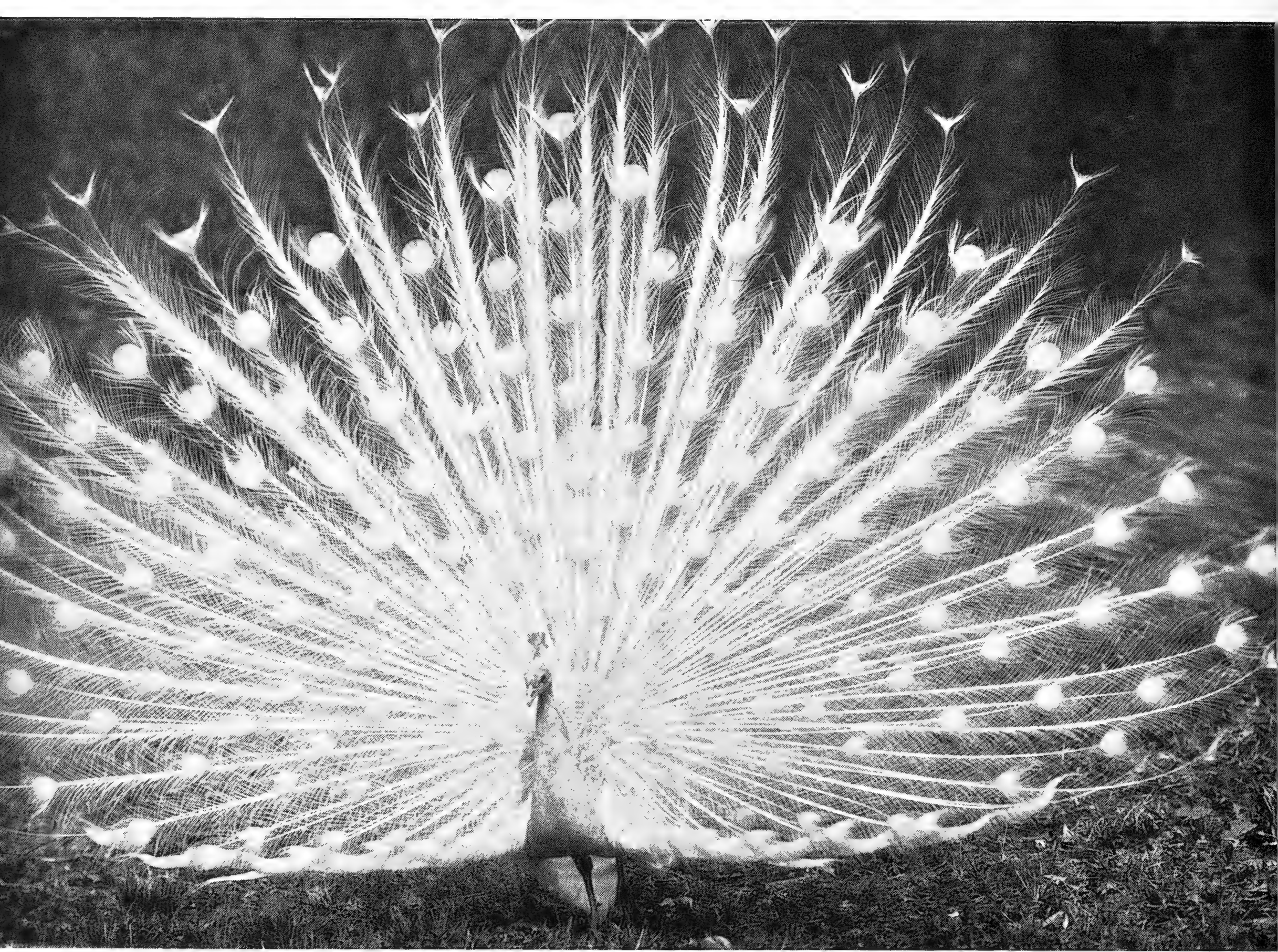
Some of our readers will hasten to inform us that the whale has not been included in the list, nor the unicorn, nor the sea serpent. As a matter of fact, the true identity of the "whale" has never been established. It may have been any large fish or aquatic mammal. The unicorn is undoubtedly a myth and the sea serpent a generality.

LIST OF 101 BIBLICAL ANIMALS

* Exhibited 1948 — N. Y. Z. P.

BIRDS

1. BITTERN. *Zeph.* 2:14: "both the cormorant and the bittern shall lodge in the upper lintels of it."
- * 2. COCK. *Luke* 22:61: "And Peter remembered the word of the Lord, how he had said unto him, Before the cock crow, thou shalt deny me thrice."
- * 3. CORMORANT. *Zeph.* 2:14: *see* Bittern.
- * 4. CRANE. *Jer.* 8:7: "Yea, the stork in the heaven knoweth her appointed times; and the turtle and the crane and the swallow observe the time of their coming."



“Gavest thou the goodly wings unto the peacocks?”

- * 5. CUCKOW (probably the Cuckoo). *Lev. 11:16*: “And the owl, and the night hawk, and the cuckow, and the hawk after his kind.”
- * 6. DOVE. *Gen. 8:8*: “And he sent forth a dove from him to see if the waters were abated from off the face of the ground.”
- * 7. EAGLE. *Prov. 30:18-19*: “There are three things which are too wonderful for me, yea, four which I know not: The way of an eagle in the air....”
- * 8. FALCON. *Lev. 11:14*: “and the kite and the falcon after its kind.” (AS)
- 9. GLEDE. *Deut. 14:13*: “And the glade, and the kite, and the vulture after his kind.”
- 10. GIER-EAGLE. *Lev. 11:18*: “And the swan, and the pelican, and the gier-eagle.”
- * 11. HAWK. *Job 39:26*: “Doth the hawk fly by thy wisdom, and stretch her wings toward the south?”
- * 12. HERON. *Lev. 11:19*: “And the stork, and the heron after her kind, and the lapwing, and the bat.”
- 13. HOOPOE. *Lev. 11:19*: “And the stork, and the heron after its kind, and the hoopoe, and the bat.” (AS)
- 14. KITE. *Lev. 11:14*: *see* Falcon.
- 15. LAPWING (a Hoopoe). *Lev. 11:19*: *see* Heron.
- 16. NIGHT HAWK. *Lev. 11:16*: *see* Cuckow.
- 17. OSPREY. *Lev. 11:13*: “they are an abomination: the eagle, the ossifrage, and the ospray.”
- * 18. OSSIFRAGE (a Vulture). *Lev. 11:13*: *see* Osprey.
- * 19. OSTRICH. *Job 39:13*: “Gavest thou the goodly wings unto the peacocks? or wings and feathers unto the ostrich?”
- * 20. OWL. *Ps. 102:6*: “I am like an owl of the desert.”
- * 21. PARTRIDGE. *I Sam. 26:20*: “for the king of Israel is come out to seek a flea, as when one doth hunt a partridge in the mountains.”
- * 22. PEACOCK. *Job 39:13*: *see* Ostrich.
- * 23. PELICAN. *Ps. 102:6*: “I am like a pelican of the wilderness.”
- * 24. QUAIL. *Ex. 16:13*: “And it came to pass, that at even the quails came up, and covered the camp.”
- * 25. RAVEN. *Gen. 8:6*: “Noah opened the window of the ark which he had made and he sent forth a raven.”
- * 26. SEA MEW (a Gull). *Lev. 11:16*: “and the ostrich, and the night hawk, and the sea mew, and the hawk after its kind.” (AS)

- * 27. SPARROW. *Ps.* 102:7: "I watch, and am as a sparrow alone upon the house top."
- * 28. STORK. *Ps.* 104:17: "as for the stork, the fir trees are her house."
- 29. SWALLOW. *Jer.* 8:7: *see* Crane.
- * 30. SWAN. *Lev.* 11:18: *see* Gier-eagle.
- * 31. TURTLE (Dove). *Jer.* 8:7: *see* Crane.
- * 32. VULTURE. *Deut.* 14:13: *see* Glede.

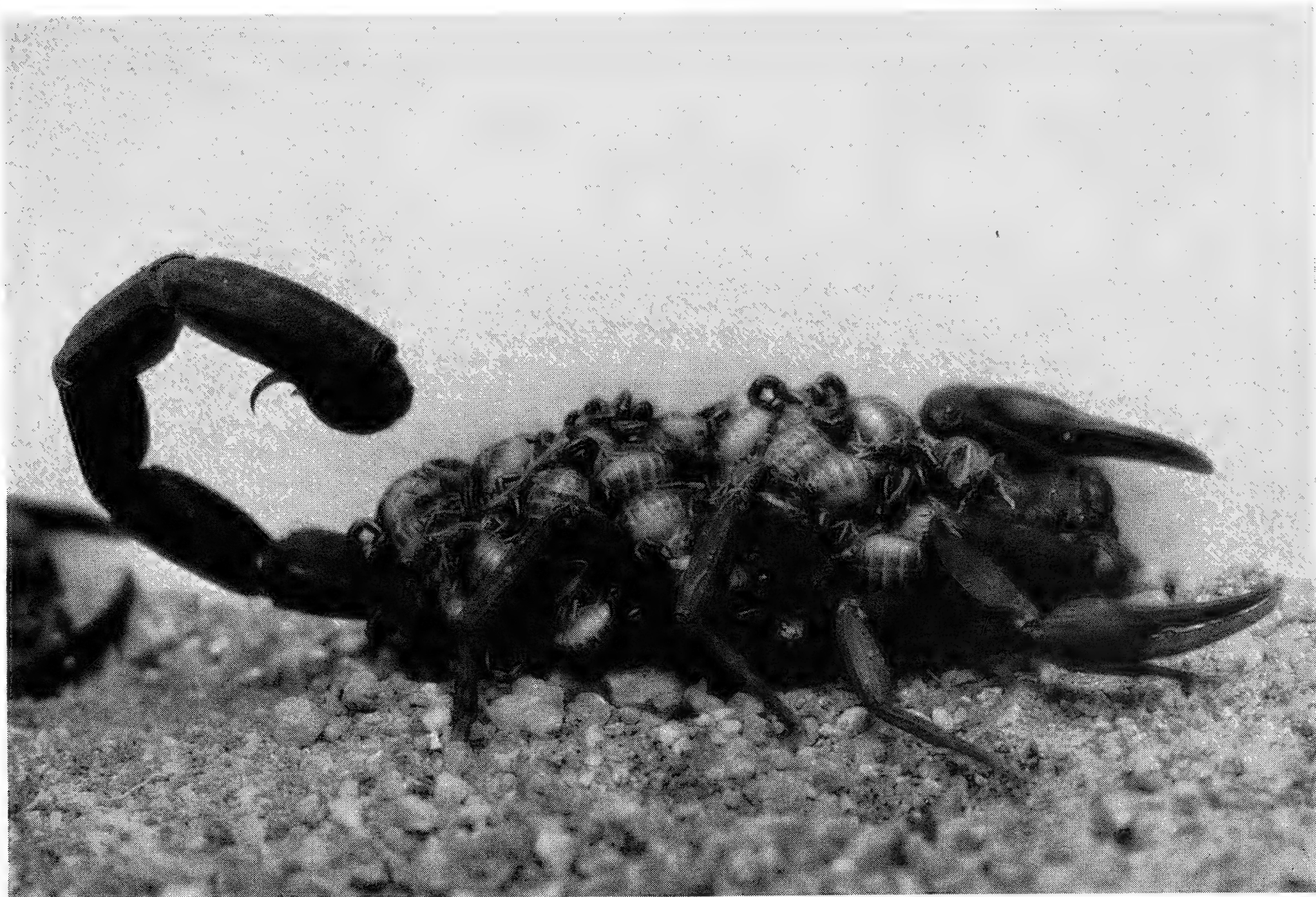
FISH

- * 33. EEL (by implication). *Lev.* 11:12: "Whatsoever hath no fins nor scales in the waters, that shall be an abomination unto you."

INVERTEBRATES

- * 34. ANT. *Prov.* 6:6: "Go to the ant, thou sluggard; consider her ways and be wise."
- * 35. BEE. *Deut.* 1:44: "And the Amorites . . . came out against you, and chased you, as bees do, and destroyed you."
- * 36. BEETLE. *Lev.* 11:22: "Even these of them ye may eat: the locust after his kind, and the bald locust after his kind, and the beetle after his kind, and the grasshopper after his kind."
- 37. CANKERWORM. *Joel* 1:4: "That which the palmerworm hath left hath the locust eaten; and that which the locust hath left hath the cankerworm eaten; and that which the cankerworm hath left hath the caterpillar eaten."

- 38. CORAL. *Job* 28:18: "No mention shall be made of coral or of pearls: for the price of wisdom is above rubies."
- * 39. CRICKET. *Lev.* 11:22: "and the cricket after its kind." (AS)
- 40. EARTHWORM. *Micah* 7:17: "They shall move out of their holes like worms of the earth."
- 41. FLEA. *I Sam.* 26:20: *see* Partridge.
- * 42. FLY. *Ex.* 8:21: "Else, if thou wilt not let my people go, behold, I will send swarms of flies upon thee."
- 43. GNAT. *Matt.* 23:24: "Ye blind guides, which strain at a gnat and swallow a camel."
- * 44. GRASSHOPPER. *Job* 39:20: "Canst thou make him afraid as a grasshopper?"
- * 45. HORNET. *Josh.* 24:12: "And I sent the hornet before you, which drove them out from before you."
- 46. HORSELEECH. *Prov.* 30:15: "The horseleech hath two daughters, crying, Give, give."
- 47. LICE (probably Ticks). *Ex.* 8:17: "Aaron . . . smote the dust of the earth, and there were lice upon man and upon beast." (AS)
- * 48. LOCUST. *Prov.* 30:27: "The locusts have no king, yet go they forth all of them by bands."
- 49. MANNA (implies Scale Insects). *Ex.* 16:15: "And when the children of Israel saw it, they said one to another, It is manna: for they wist not what it was."



"And they had tails like scorpions, and there were stings in their tails."



"The coney are but a feeble folk, yet they make their houses in the rocks."

- * 50. MOTH. *Matt.* 6:19: "Lay not up for yourselves treasures upon earth, where moth and rust doth corrupt."
- 51. OYSTER (by implication). *Job* 28:18: *see* Coral.
- 52. PALMER WORM. *Joel* 1:4: *see* Cankerworm.
- * 53. SCORPION. *Rev.* 9:10: "And they had tails like scorpions, and there were stings in their tails."
- * 54. SILKWORM (by implication). *Ezek.* 16:10: "and I cover thee with silk."
- * 55. SNAIL. *Lev.* 11:30: "And the ferret, and the chameleon, and the lizard, and the snail, and the mole."
- * 56. SPIDER. *Prov.* 30:28: "The spider taketh hold with her hands, and is in kings' palaces."
- 57. SPONGE. *Matt.* 27:48: "and straightway one of them ran, and took a sponge and filled it with vinegar."
- MAMMALS
- 58. APE (probably Baboon). *I Kin.* 10:22: "Once in three years came the navy of Thalshish, bringing gold, and silver, ivory, and apes."
- * 59. ASS. *Job* 6:5: "Doth the wild ass bray when he hath grass?"
- 60. BADGER. *Ezek.* 16:10: "I clothed thee also with broidered work, and shod thee with badgers' skin."
- * 61. BAT. *Lev.* 11:19: *see* Heron.
- * 62. BEAR (probably European Brown). *Is.* 11:7: "And the cow and the bear shall feed; their young ones shall lie down together: and the lion shall eat straw like the ox."
- * 63. BEHEMOTH (probably a Hippopotamus). *Job* 40:15: "Behold now behemoth . . . he eateth grass as an ox . . . he trusteth that he can draw up Jordan into his mouth."
- 64. BULLOCK. *Lev.* 16:3: "Thus shall Aaron come into the holy place with a young bullock as a sin offering."
- * 65. CAMEL. *Gen.* 24:19: "And when she (Rebekah) had done giving him drink, she said, I will draw water for thy camels also."
- 66. CATTLE. *Ps.* 104:14: "He causeth the grass to grow for the cattle."
- * 67. CHAMOIS (probably Aoudad). *Deut.* 14:4: "These are the beasts which ye shall eat: the ox, the sheep, and the goat, the hart, and the roebuck, and the fallow deer, and the wild goat, and the pygarg, and the wild ox, and the chamois."
- * 68. CONY (a rodent called Hyrax). *Prov.* 30:26: "The conies are but a feeble folk, yet make they their houses in the rocks."
- * 69. DEER (Fallow). *Deut.* 14:5: *see* Chamois.

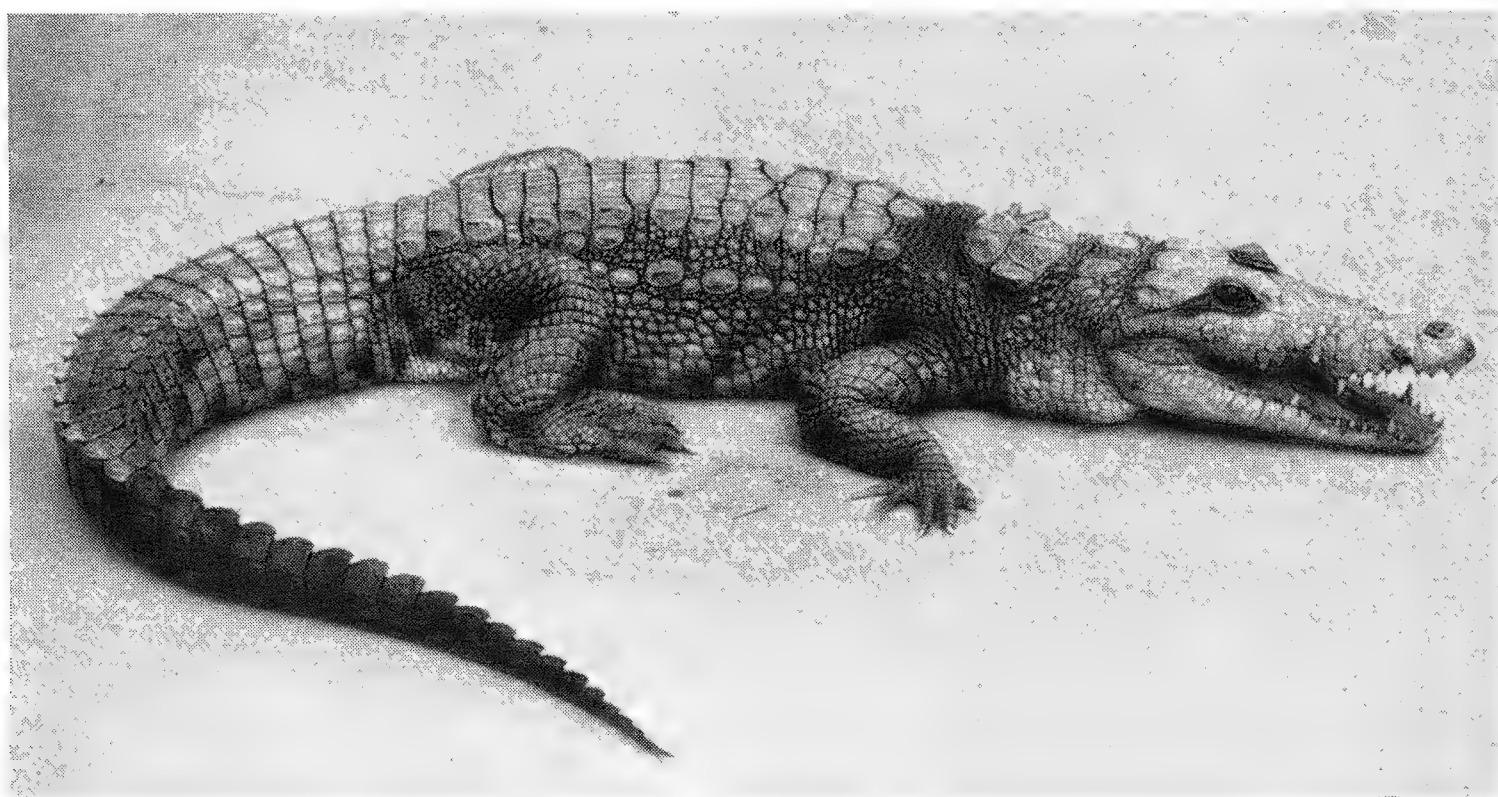
- * 70. DOG. *Matt.* 15:26: "It is not meet to take the children's bread, and to cast it to the dogs."
- * 71. DROMEDARY. *Is.* 60:6: "The multitude of camels shall cover thee, the dromedaries of Midian and Ephah."
- * 72. ELEPHANT (probably African). *I Kin.* 10:18: "Moreover the king made a great throne of ivory, and overlaid it with the best gold."
- 73. FERRET. *Lev.* 11:30: *see* Snail.
- 74. FOX. *Matt.* 8:20: "And Jesus saith unto him The foxes have holes, and the birds of the air have nests."
- * 75. GOAT. *Ps.* 104:18: "The high hills are a refuge for the wild goats."
- * 76. HART. *Is.* 35:6: "Then shall the lame man leap as an hart."
- * 77. HIND. *Gen.* 49:21: "Naphtali is a hind let loose: he giveth goodly words." (AS)
- * 78. HORSE. *Job* 39:19: "Hath thou given the horse strength? has thou clothed his neck with thunder?"
- 79. HYAENA (by implication). *Is.* 13:21: "But wild beasts of the desert shall lie there; and their houses shall be full of doleful creatures; and owls shall dwell there, and satyrs shall dance there."
- 80. JACKAL. *Is.* 13:22: "And wolves shall cry in their castles and jackals in the pleasant palaces." (AS)
- * 81. LEOPARD. *Jer.* 13:23: "Can the Ethiopian change his skin, or the leopard his spots?"
- * 82. LION. *Prov.* 30:31: "A lion which is strongest among beasts, and turneth not away from any."
- 83. MOLE. *Lev.* 11:30: *see* Snail.
- * 84. MOUSE. *Lev.* 11:29: "These also shall be unclean unto you among the creeping things that creep upon the earth; the weasel, and the mouse, and the tortoise after his kind."
- 85. MULE. *Gen.* 36:24: "this was that Anah that found the mules in the wilderness, as he fed the asses of Zibeon his father."

86. Ox. *Is.* 11:7: *see* Bear.

- * 87. PORCUPINE (probably Hedgehog). *Is.* 34:11: "But the pelican and the porcupine shall possess it." (AS)
- * 88. PYGARG (probably an Addax). *Deut.* 14:4: *see* Chamois.
- 89. ROEBUCK. *Deut.* 14:5: *see* Chamois.
- * 90. SHEEP. *Is.* 53:6: "All we like sheep have gone astray."
- * 91. SWINE. *Deut.* 14:8: "And the swine, because it divideth the hoof, yet cheweth not the cud, it is unclean to you."
- 92. WEASEL. *Lev.* 11:29: *see* Mouse.
- * 93. WOLF. *John* 10:12: "The wolf also shall dwell with the lamb."

REPTILES & AMPHIBIANS

- * 94. ADDER. *Gen.* 49:17: "Dan shall be a serpent by the way, an adder in the path, that biteth the horse heels."
- * 95. CHAMELEON. *Lev.* 11:30: *see* Snail.
- 96. DART-SNAKE (a lizard). *Is.* 34:15: "There shall the dart-snake make her nest, and lay, and hatch."
- * 97. FROG (probably European Edible Frog). *Ex.* 8:3: "And the river shall bring forth frogs abundantly, which shall go up and come into thine house."
- * 98. GECKO. *Lev.* 11:30: "And these are they which are unclean unto you . . . the great lizard after its kind, and the gecko." (AS)
- * 99. LEVIATHAN (probably Nile Crocodile). *Job* 41:14: "His teeth are terrible round about. His scales are his pride, shut up together as with a close seal . . . the arrow cannot make him flee."
- * 100. TORTOISE. *Lev.* 11:30: *see* Mouse.
- * 101. VIPER. *Matt.* 3:7: "he said unto them, O offspring of vipers, who hath warned you to flee from the wrath to come?"



"His teeth are terrible round about. His scales are his pride, shut up together as with a close seal."



Small but important is this shy Elephant Shrew from East Africa, one of a large group of insectivores with a wobbly, “elephant trunk” nose.

Zoo Celebrities

Photographs by Sam Dunton



An enormously enlarged photograph of a Parasol Ant from the American tropics, showing how it carries a piece of rose petal to its nest.



The Flap-necked Chameleon from tropical Africa is a striking and perennially fascinating creature, for its eyes roll in different directions.





Pere David's Deer is one of the world's great rarities, extinct in its native China. We have four, from the Duke of Bedford's herd in England.



Cottonhead Marmosets from eastern Brazil have never bred in the Zoological Park until this fall. This is the father, carrying one of two babies.



A magnificent young Moose, born in Maine in 1945 and received by us in 1947. He shows only the promise of great antlers that are still to come.

How a Harpy Eagle Came to Us

By E. W. PFEIFFER

AS A KEEN FOLLOWER of the sport of Falconry, I have always had an interest in the giant tropical eagles, very few of which have ever been tamed. A study of books and museum specimens in the days before World War II had led me to believe that the South American Harpy Eagle was the ultimate in winged killers and a most dramatic bird. It was, therefore, with high hopes of securing this eagle that I found myself stationed in north Brazil during part of the war.

Several dreary months passed and I had come no closer to the Harpy Eagle than learning its Brazilian name, "Gaveao real" or royal hawk. Then someone flew into our Air Force base from Belem, the city at the mouth of the Amazon. Several huge, crested eagles were reported by him in the city's zoological gardens, and my hopes of securing a Harpy rose.

While I was devising ways and means of getting a flight to Belem, our fleet commander solved my problem by ordering his plane to that city. It happened that the admiral's pilot was a friend of our outfit, and readily agreed that a Harpy Eagle would make a fine mascot. Although the pilot was a man of great resourcefulness, I was, indeed, amazed when he shortly returned with a nearly full-grown male Harpy Eagle, the first I had ever seen alive. Contrary to expectations, the eagle proved to be very docile and before long was perching contentedly outside our barracks, equipped with the jesses, hood and leash used in Falconry. Subsequent correspondence with his captor, a former Austrian zoo collector isolated in Brazil by the war, revealed the reason for our fierce mascot's tameness. During a trip up the Amazon river, the collector had come upon a huge tree, felled by a violent storm. From the remains of a nest he had rescued a ball of down that grew into a Harpy Eagle in

the civilized environment of his home in Belem.

The docility of the bird was a disappointment from the falconer's point of view. Due to his early handling, the eagle lacked that aggressiveness and dash which make a good hunter, and it was with difficulty that I induced him to make even short flights to my fist for food. He was perfectly content to sit all day and doze in a really tropical fashion. As he had the temperament of a fine cage bird, we decided to attempt to get him into the United States.

This presented something of a problem as only high priority war material was being transported at that time, and eagles did not appear to fall into this category. However, a few glasses of Brazilian beer on the eve of his departure for the U.S.A. induced another pilot friend to fly the eagle at least part way to North America. The next morning the bird was crated and stuffed into the tail section of a Catalina patrol bomber. As none of the plane's crew had had any experience handling eagles, I was somewhat doubtful of our mascot ever reaching the States. It was, therefore, good news when a squadron paper arrived from the Naval Air Station in Puerto Rico with a photo of our eagle as the new squadron mascot. Some weeks later word came from New York that the eagle had arrived in the New York Zoological Park, the first Harpy Eagle to be exhibited there for several years.

After my return to the States, I called on the eagle in his new home, and learned from General Curator Crandall that our pilot friend had managed to get the bird aboard a Martin bomber he was ferrying to the mainland from Puerto Rico. As the eagle sat contentedly watching the zoo visitors, I recalled the curious chain of events that brought him from the jungles of the Amazon to the heart of New York City.



On its way to a home in the New York Zoological Park, our Harpy Eagle was adopted as a mascot by Navy fliers, as a symbol of air power.

European Zoos Revisited

By LEE S. CRANDALL

A MEETING of the International Society of the Directors of Zoological Gardens, to be held in Paris, was the principal objective of a visit to Europe in late June of this year. Only fifteen days could be allotted for the trip but the saving of time gained by air travel gave ample opportunity for inspection of the zoological highlights of England, Belgium and France. The company included Dr. William Mann, Director of the National Zoological Park in Washington, D. C., and Mrs. Mann; Freeman Shelly, Director of the Philadelphia Zoological Gardens; Jean Delacour and myself. We were able to renew old acquaintance, visit many installations, some unknown, some previously familiar to most of us, to attend several social functions of importance and take part in the Paris conference, all in no more time than would have been required for a two-way ocean voyage.

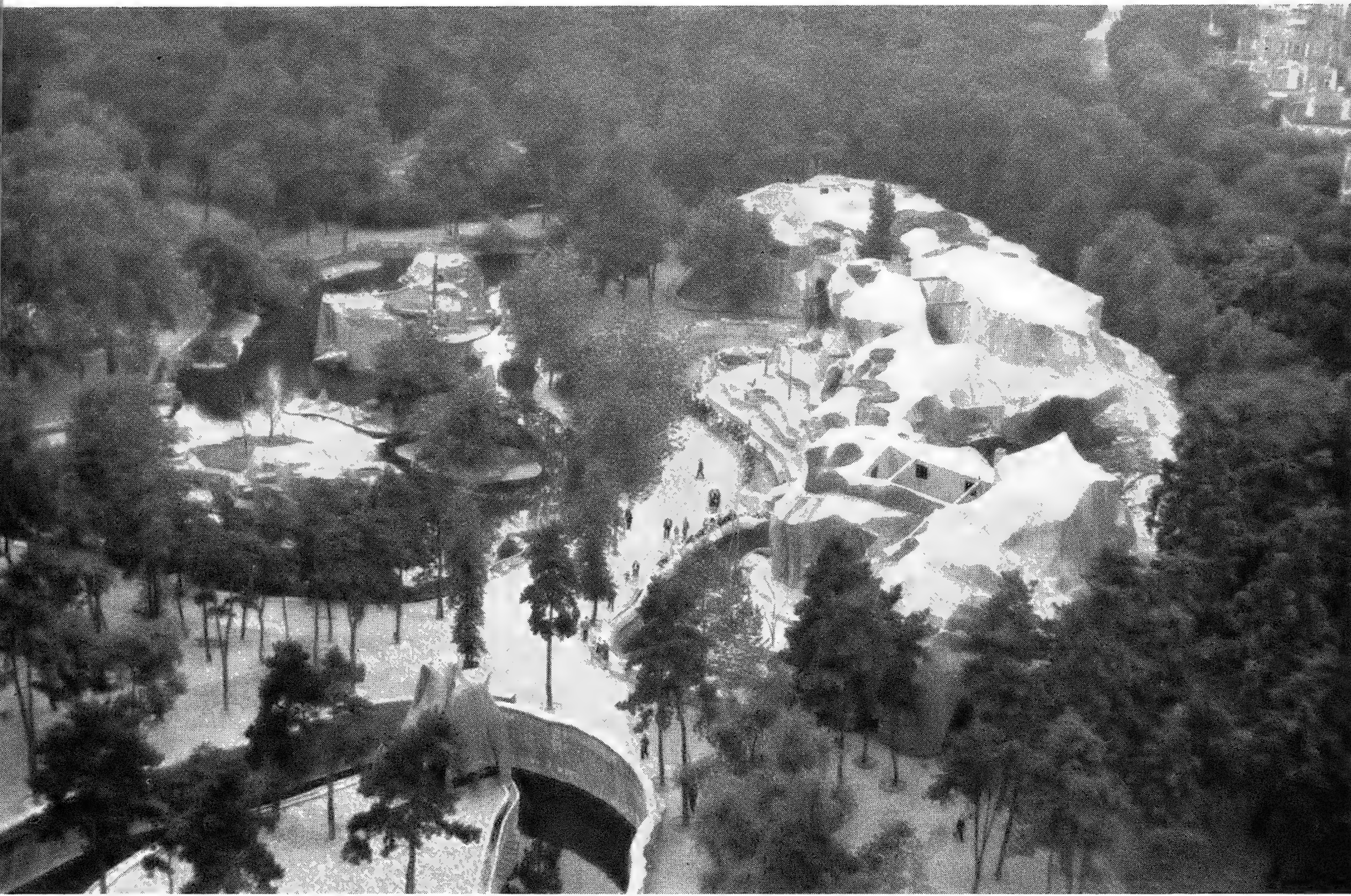
Western Europe, war-wracked and struggling with economic and political problems, still retains the deep-seated love for nature which has always solaced the peoples of troubled nations. The Zoological Gardens of London and Antwerp suffered serious war damage, which already has been largely repaired. The famous old Jardin des Plantes in Paris and the shining modern installation at Vincennes were practically undamaged. All of these institutions, while still not entirely clear of difficulties, were exhibiting adequate collections, well fed and well cared for, and were enjoying large patronage by the public.

A rainy Sunday was spent in the Antwerp Zoo, slogging about among thousands of intrepid visitors. For the Antwerp Zoo, badly damaged by bombs, is undergoing an actual renaissance in

which it has the whole-hearted support of the Belgian people. The principal accomplishment, so far, is a complete alteration of the Bird House, embodying numerous important changes. All of the cages in the main halls are now glass-fronted, several being viewable from three sides. Wherever possible, planting has been introduced, so that the effect is altogether charming, in the most modern sense. The greatest advance is to be found in a darkened room, approached through a dimly lighted corridor. Here a long range of cages, perhaps four feet in each dimension, has been installed. Because of the soft but intense glow of fluorescent lights, set in a square just inside the front of each cage, one does not notice, at first, that there is no glass. Even from the distance of five feet, at which the guard-rail is set, the birds are seen with utmost clarity. The underlying principle is that the birds are restrained by the bright lights, beyond which they can see only darkness. Mr. Walter van den bergh, the Director, is to be congratulated on the development of this attractive innovation, further elaboration of which may very well bring important results.

London's collections seemed to us very good and in many sections, well up to the traditional standards. Prohibition of animal importations except by recognized institutions, has caused the Society to send into the field numerous expeditions of its own. It is by this means that the collections, particularly of African fauna, have been built up. The old Insect House, now used for birds, has been through another revamping, in accord with the modern trend.

Whipsnade, London's country Zoo, has been



The great pinnacle of artificial rock in the Vincennes Zoo gives a view over all of this modern animal installation. Now softened by time, the rockwork is an attractive animal setting.

greatly improved. A small herd of Père David's Deer, furnished by the Duke of Bedford, roams one of the huge paddocks. A group of Bactrian Camels, obtained from Russia before the war, has multiplied to such an extent that spares have been furnished numerous other Zoos. A large pheasant breeding plant, from which the public is excluded, is in full production and promises to help restock the depleted aviaries of Europe. From a rather unpromising beginning, Whipnade has greatly increased in drawing power through and following the war, so that it now attracts the public in constantly growing numbers.

Before leaving England, we had opportunity, by means of transportation furnished by the Zoological Society, to visit three private collections of importance. We journeyed first to the lovely home of Mr. Alfred Ezra, at Cobham, Surrey, enjoyed the hospitality for which our old friend is noted and went through the famous aviaries in which the well-known lutino parakeets and Rothschild Mynas are still breeding.

Next, we took train for Leckford, the home

site of Mr. Spedan Lewis. Here, in an Old World setting, we saw dozens of young pheasants of many rare species, as well as large numbers of young waterfowl, in process of rearing under the personal care of Mr. Terry Jones, the Curator. We enjoyed, too, renewing acquaintance with Miss Chawner, Curator Emeritus of this well-known collection and famous in the annals of British aviculture.

Finally, in company with Dr. Vevers, Superintendent of the London Zoo, and Miss Phyllis Barclay-Smith, whose plans in our behalf were invaluable, we motored to Woburn Abbey, the estate of the Duke of Bedford. In the absence of His Grace, we were welcomed by Mrs. Osborne Samuel, Estate Manager, and turned over to the Head Keeper for an extended tour by motor.

In all the world, there can be nothing like Woburn Abbey. Steeped in tradition, the mecca of zoologists for generations, its spreading terrain is almost hallowed ground. Four thousand acres of green, deep-rooted turf, dotted over with groves of oak and beech and numerous small

lakes, are the home of great herds of deer of many kinds, which roam almost without restraint. The great house with its lovely gardens, the offices and work buildings, are surrounded by well hidden "ha-has" or half moats, to prevent intrusion by the stock. Otherwise, the ancient boundary walls provide the only limits to their wanderings.

Easily approached by motor, though not on foot, herd after herd, usually composed of several species, was encountered. Fallow Deer in all the color varieties and numbering more than a thousand, were most numerous. Mingled with them were Axis, Sikas and European Red Deer, among the latter many piebald individuals.

The most inspiring sight of all was the herd of Père David's Deer, totalling about three hundred. We found them strung out in a long line, just across a deep lagoon. Some grazed, some enjoyed their ease in the noon-day sun. Spotted among them were several great gray-faced stags, just beginning to feel the urge of the mating season, with no decision as yet as to which would be the master. And over all, the swirl of long, up-swinging tails, typical of no animal but Père David's Deer. Seeing them so, it was hard to believe that here were the only survivors of an almost vanished species, preserved so far from their inhospitable home in China through the benevolent interest of a man who would not see them vanish.

At the far side of the Park, spacious fenced paddocks enclose the herd of eighteen European Bison or Wisents. Unfortunately, there is an infusion of the blood of American Bison in many of the animals and there are only four cows remaining of unclouded ancestry. Two of these are still of breeding age but there is no pure Wisent bull in England with which to mate them and currency regulations make importation impossible.

It is a far cry from the broad lawns of Woburn to the narrow confines of the Jardin des Plantes. There is none of the glamor of Paris here but there is ample compensation in the strong traditions of days long gone. The beautiful little house of the famous Cuvier still stands and many ancient animal buildings dating from early in the 19th Century continue in use. The combination Reptile and Insect House has many interesting

and unusual exhibits. In the more modern Ape House live a female Gorilla received in 1931 and a huge male Orang-utan, also a pre-war arrival. There is a fine young West African Elephant of the forest type, also a superb old male Markhor with immense spiral horns.

The new Zoo at Vincennes is so much in the modern trend that it has little resemblance to its urban predecessor. Built as a series of spectacles, it makes use only of the larger species, with no accommodations for reptiles and the smaller birds. The immense and beautifully executed moated enclosures looked new and raw in 1938. Now softened by time and skilfully planted vegetation, they achieve the effect for which they were planned. Under the able supervision of Professor Achille Urbain, Director of the Museum of Natural History, Vincennes has taken a place in the forefront of living zoological exhibits. The great pinnacle, with moated Lions at its base and Aoudads on a plateau above, is superb. The Giraffe quarters are outstanding for clever operational arrangement, while the exhibit of Guinea Baboons, which must number fifty animals of varying ages, is not only successful but most attractive.

Before leaving France, we had opportunity to visit the Zoological Park of Clères, as the guests of Jean Delacour. Frank Fooks, the Director, has done wonders in repairing war damage, so that a few gaping shell holes, in remote areas, are all that remain to mar the scene. While the famous Duckeries and parts of the Pheasant Aviaries are beyond repair, the stock is rapidly being built up and the collections are not too far below normal.

* * *

To create a factual, objective report of this visit to Europe has been a most difficult task, for places and things are inextricably interwoven with personalities. I ask indulgence in this conclusion for space to express my gratitude to the men and women who made this journey ever-memorable to me. Over the years, through personal contacts and correspondence and a mutuality of interests, I have come to look upon many persons abroad as old and dear friends. To meet, in such a short space of time, so many of them and to encounter so many new acts of kindness and so many new friends, was an emotional experience that affected me profoundly.

News from the Conservation Foundation

President Osborn Sparks Herald Tribune Forum

SPEAKING on the general theme of "Our Imperiled Resources," leading exponents of the new conservationism addressed a capacity audience in the ballroom of the Waldorf-Astoria on the evening of October 18, 1948, under the auspices of the New York *Herald Tribune*. This first session of the 1948 Forum, which was devoted to conservation, was opened with a keynote introduction by Bernard Baruch on the broad purposes of the entire series of four meetings. Fairfield Osborn, president of the Zoological Society and the Conservation Foundation, made the opening address on conservation based on the thesis of his book "Our Plundered Planet."

"This evening promises to be an epoch-making event," said Mr. Osborn. "It is the first time, as far as one can recall, that a great public forum is discussing the primary problem of the human race: 'How do we get what we need to keep us alive?' May this occasion lead to countless other similar forums."

"The problem actually is as old as human history, but in recent times the dazzling triumphs of materialism and industrialization have dimmed our eyes to its urgency. Now we are compelled to deal with the problem as we never have before. The signs are pressing upon us."

Pointing out that the conservation battle in this country cannot be won by legislation and government alone, Mr. Osborn pleaded for a new and enlightened viewpoint on the part of the public. It can be won he emphasized by a "supreme partnership of individual effort, of public opinion, of labor, industry and government working together."

Other speakers on the Resources program were Louis Bromfield who described the advance of the conservation work on his famous "Malabar Farm;" William Vogt who spoke to the theme of his new book, "Road to Survival," and Paul G.

Hoffman, Economic Cooperation Administrator, the title of whose speech was "No Man is an Island."

A four-man panel debated "What Land Policy for America?" Led by Representative Clifford R. Hope, of Kansas, Chairman of the House Agriculture Committee, the panel included Gordon R. Clapp, Chairman of the Board, Tennessee Valley Authority; Farrington R. Carpenter, Member of the Executive Council, American Livestock Association; Kent Leavitt, President of the National Association of Soil Conservation Districts; and Bernard de Voto, author.

This conservation session of the Forum was most successful as a stimulator of popular interest from the viewpoint of the Foundation. In its planning, officials of the staff, Mr. A. William Smith in particular, were active, and Mr. Smith cooperated with the *Herald Tribune* in preparing a "Discussion Guide" on our renewable natural resources to be used in organizing similar forums throughout the country at the local level. This guide is something of an innovation in *Herald Tribune* Forum procedure, and the demand for it has been more than double the expectations.

Brewer Attends European Meetings

GEORGE E. BREWER, JR., an officer of the Conservation Foundation staff, returned on October 22 from the meetings at Fontainebleau, France, where European and American conservationists met for the purpose of determining future plans for the International Union for the Protection of Nature. This convention, growing out of the Conference at Brunnen, Switzerland, held in 1947, was concerned chiefly with the possible scope of the Union's work, its permanent headquarters and the personalities of its staff.

Mr. Brewer was accompanied by Mr. Harold Coolidge, a member of the Foundation Advisory

(Continued on Page 186)

BEHIND THE SCENES

NEWS AND NOTES OF THE ZOOLOGICAL PARK, THE AQUARIUM AND THE DEPARTMENT OF TROPICAL RESEARCH

What Fish Is (Was) It?

Since there are more than twenty thousand different kinds of fishes, no ichthyologist can recognize on sight all of the species that come into his hands. When confronted with a specimen new to him, he must consult various monographs, faunal lists and taxonomic papers and then compare his fish with the descriptions given in the scientific literature. This comparison usually entails the counting of fin rays and scales and the careful measurement of several body dimensions, such as those of the head, tail, fins and eyes. These determinations are sometimes difficult to make even with a completely tractable, dead specimen; to do so with a wriggling, slippery live one would be impossible without irreparably damaging it.



It's "*Gnathonemus petersii*"

Fishes never before obtained for exhibition appear at the Aquarium each year, and their proper identification often has to wait on their demise. When a delicate, new mormyrid appeared last summer, it could only be tentatively identified as *Gnathonemus petersii* until it died and could be subjected to careful examination — which in this case confirmed the tentative diagnosis. Another kind of mormyrid that was obtained by the Aquarium at about the same time is still living —

with a provisional label, *Marcusenius longianalis*, on its tank.

An escape from this dilemma between a known dead fish in a preserving bottle or an unknown living one on exhibition was provided by a pair of colorful, unidentified South American cichlid fish that the Aquarium now has. Last September they produced several hundred offspring. These are now growing up in a reserve tank and when they are large enough, a couple of them will be sacrificed to provide, in reverse of the more usual procedure, a name for their parents.— J. W. ATZ.

Conservation Foundation News

(Continued from Page 185)

Council, and Mr. Ira Gabrielson, both of whom were representatives of the State Department at these meetings. Mr. William Vogt was also present as a representative of the Pan American Union.

The objectives of the Union were established on a front sufficiently broad to win the support of such American conservation organizations as should have a permanent interest in its progress. Union headquarters will be based in Brussels, and the conference vested its future in the hands of a highly competent executive board with its members representing conservation interests not only in North and South America but in Great Britain, France, Holland, Sweden and Belgium among a large number of European states sending delegates.

The American delegation came away well pleased with the start that had been made towards a basic international conservation agency.

Before returning Mr. Brewer and Mr. Coolidge visited England where they conferred with the British members of the Foundation's Advisory



This Galeated Curassow, a rare bird seldom exhibited here, is a newcomer presented by Dr. Alfonso Pons, director of the Zoo in Maracaibo, Venezuela. Its plumage is black and white.

Council, Messrs. H. Godwin, A. V. Hill and Charles Elton. The role of these men in the future affairs of the Foundation was discussed in detail, and an eminently satisfactory agreement was reached with respect to the help they can render.

Mr. Brewer left a copy of the "Living Earth"

Series of conservation films with Miss Miriam Rothschild, active in all important British conservation activities. They have since been shown at such meetings as that of the British Ecological Society, and a number of highly favorable reports of them have been received at Foundation headquarters.

Snider Views Missouri Valley

ROBERT SNIDER, the Foundation's Director of Research, made an air trip over the territory of the Missouri River Valley from September 26 to October 4, in company with Kent Leavitt, President of the National Association of Soil Conservation Districts. The purpose of the visit was to secure a first-hand knowledge of current conservation practices in this highly important area extending from the Rocky Mountains eastward to the confluence of the Missouri River with the Mississippi.

In the course of the trip, which was made largely by chartered 'plane, Messrs. Leavitt and Snider talked with many ranchers, farm leaders and government representatives. This check-up

is an extension of the Foundation's program to view the more important areas of the country where conservation needs must be considered on a wide-scale basis.

Record at Children's Zoo

Closing its eighth summer season on November 14, the Children's Zoo established a record for attendance with 350,423 visitors. In 1947 it had 323,000 visitors, and 325,000 in 1946.

How Did She Do It?

A feat of agility and strength that still surprises the staff of the Zoological Park was performed this fall by our Giant Panda.

At one period when she was in ill health, Dr.



The Parasol Ant exhibit in the lobby of the Reptile House has recently been redesigned, replanted and given a more prominent setting. It provides a fascinating spectacle of activity to visitors.



Most of the Pere David's Deer left alive in the world today are to be seen in this picture — the herd of 300 animals on the Duke of Bedford's estate at Woburn Abbey in England. The estate consists of some 4,000 acres of rolling, wooded land where the deer live at virtually complete liberty. From this great herd a few animals have been selected for presentation to zoos.

Leonard Goss, our Veterinarian, ordered her confined at night in the indoors quarters of her exhibition area. Access to the out of doors is by means of an iron-barred door, five feet four inches long and four feet three inches high, which travels in iron channels and is raised and lowered by the keeper by means of a pulley. The door weighs 148 pounds, works rather hard, and Keeper Vincent Nesor has to "put his back into it" in order to raise the door for the Panda to go out.

The first morning after the Veterinarian ordered the animal kept inside, Keeper Nesor arrived for his morning inspection — and found no Panda! Bits of wood apparently chewed from the base of the door were scattered over the floor. He tugged on the pulley rope until the door opened. In walked the Panda.

Somehow, during the night, she had managed to get her claws or muzzle under the edge of the door, even though it fitted flush with the ground, and had hoisted it until she could

squeeze out. We don't know yet how she did it — but she had no human help.

PUBLICATIONS OF INTEREST

WINGS IN THE WOODS. By Robert M. McClung. 251 pp., black and white illustrations by the author. William Morrow & Co., New York, 1948. Price \$2.50.

A boy's summer on a farm, recorded for eleven to fourteen year olds, by the Assistant in our Department of Mammals and Birds. Threaded through the story is a fascinating and authentic account of the life histories of native butterflies and moths. Nature-minded children of any age will be enthralled by this unusual story and adults will find it pleasant reading. L.S.C.

ANT HILL ODYSSEY. By William M. Mann. 338 pp., six photographs, five maps. Little, Brown and Co., Boston, 1948. Price \$3.50.

Dr. Mann, Director of the National Zoological Park in Washington, is known and loved as a raconteur and good companion from Washington to Arlington, the long way around. Now many of the tales with which for years he has regaled his friends are joined in pleasant sequence. It is typical of Dr. Mann that his auto-



In this series of six large out-of-doors cages on the east side of the Small Mammal House, recently reconstructed and planted, we expect to provide a summertime exhibit of monkeys.

biography should be so thickly interspersed with ants, beetles, scorpions, strange lands and stranger people, that there is little space left for the author himself. In spite of these diversions, enough of the author emerges to disclose him as a naturalist by nature, who became a trained zoologist only because a final Ph.D. was inci-

dental to the collecting expeditions that were his passion. Whether for a good story well told or the fascinating ways of ants, you will enjoy this book. Most of all, in either case, you will enjoy learning about Bill Mann. For the annual crop of young people who yearn to become naturalists, "Ant Hill Odyssey" is a must. L.S.C.

New Members of the New York Zoological Society

(Between September 1 and October 31)

LIFE

William Bridges
Eli Whitney Debevoise
Mrs. David M. Keiser

CONTRIBUTING

Mrs. John P. Allee
James M. Austin
Mrs. Graham L. Bennett
Theodore Bernstein
S. Bieber
George L. Bubb
George Doubleday
Henry S. Glazier, Jr.
J. R. Harrison

Edward Barry Nugent Head
James A. Stack

ANNUAL

Mrs. Walther R. Basch
Master Charles H. Blake
Mrs. Emily Davis Chamberlain
Miss Elizabeth Dutch
Mrs. Martin F. Emory
Master David A. Follett
Kenneth H. Hannan
Clay Judson
Mrs. Gustav H. Lamm
Walter V. Landeck
Mrs. Robert C. Livingston

Charles C. Marino
William R. H. Martin
Leon A. Maybarduk
Herbert Meyer
A. Louis Oresman
Mrs. Samuel M. Page
Mrs. Nancy G. Price
Lawrence Rusecki
Ivan T. Sanderson
Miss Genevieve Schultes
Marcel H. Stieglitz
Mrs. Lyman Beecher Stowe
Norman Sweetser
Mrs. Hede Vasen
K. C. Waddell

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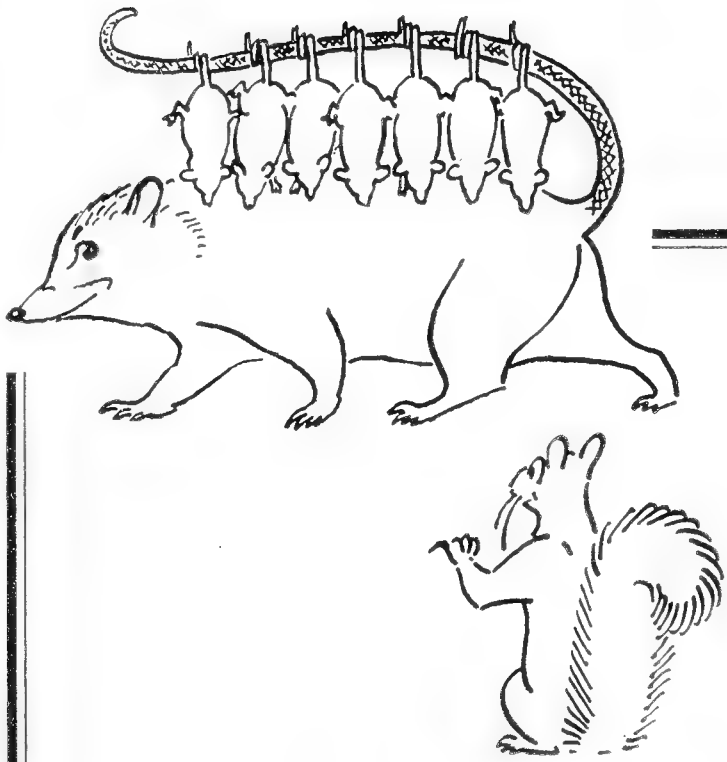
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"Always ROOM for ONE More!"

WHEN AN ORGANIZATION is going places it needs new members more than ever. And your Society's biggest year thus far is just ahead of it in 1949!

We expect now to undertake many fascinating new projects in the months ahead. Many interesting events are in store. Unusual and new services to members are in preparation.

Don't think we've been playing 'possum just because we haven't urged you to send us new members since last spring. Now is the time to send us their names — make them gift memberships. Bring them in on the whole 1949 program!

We start early this year with our annual meetings on January 5th and 6th.

Send us new members now!

There's always room for more!

Membership Committee
NEW YORK ZOOLOGICAL SOCIETY
New York Zoological Park
Bronx Park
New York 60, New York



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